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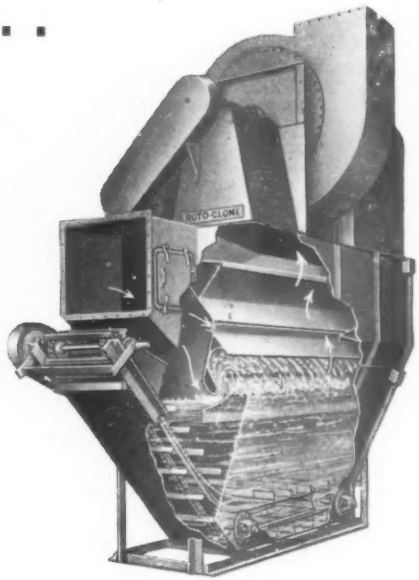

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PRINCIPAL CONTENTS

Technical : PAGE

Casting Winder-drum Cheeks, by A. W. Bartlett:
A description of winding engines, their purpose and design, is followed by an account of the production by loam moulding of the half-drum cheek castings, including pairing of the half-cheeks, core-box design and coremaking, bottom-plate construction, mould reinforcement and actual mould making 563

Solubility of Hydrogen in Iron/Carbon/Silicon Alloys—Discussion:
Authors' introduction to the Paper and a report of the discussion which took place when it was presented to the annual conference of the Institute of British Foundrymen in Cardiff this year . . 571

British Cast Iron Research Association Annual General Meeting:
Election of officers and the work of the Association in relation to the future needs of the ironfounding industry. . . 579

Casting Metals in Glass Moulds, by Thomas A. Dickinson 583

Features :

Leader: **The Battle of the Bulge** . . 561
Notes from the Branches, House Organs and New Catalogues 582
Equipment and Supplies 585

Commercial :

British Blast Furnaces in the September Quarter, 1956 . . . . . 576, 577
Company News 578
New Patents 586
Raw Material Markets 590
Current Prices of Iron, Steel and Non-ferrous Metals 592

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The Battle of the Bulge

A very interesting conference, organized by the Council of Ironfoundry Associations, was held last week in London. It certainly expressed full views as to the training necessary for the needs of its future managers. Those attending heard from Dr. J. G. Pearce (director, British Cast Iron Research Association), statistics which stressed that if we were to maintain a place at the head of the queue for business in the export markets—especially in Europe—industry would require very many more trained technologists in the foundry—not only in the iron industry. Dr. Ivanoff (Hayward, Tyler & Company, Limited) even suggested the employment of technologists skilled in sciences other than foundry techniques. The Rt. Hon. Iain Macleod, M.P., the Minister of Labour and National Service, told the conference that if founders were really honest in the desire to recruit skilled personnel, the present was a heaven-sent opportunity, as for the next five years there was to be a bulge in the curve of annual school-leavers, after which a large reduction would occur. This fact is well known, and industries competitive with the foundry are making serious efforts to obtain their quota.

The number of students at the National Foundry College was shown statistically to be—in comparison with other industrial countries—grossly inadequate. Proof was submitted of the great use made by American foundries of qualified technicians, which had resulted in much greater production in foundries for the same or fewer men. It was thought that in this country, too, more supervision in manufacturing would pay dividends and increase individual earnings. Questions were asked as to whether the small jobbing shops were "on the way out," but surely the answer is embodied in the fact that most of the great automobile foundries have a jobbing foundry as an essential feature of their maintenance department.

We thought the chairman of the conference, Sir Harold West, hit the nail on the head when he suggested the problem needed breaking down. As foundries are not standardized, so, too, the technical personnel needed are not of uniform type. The group which should be most concerned are the medium-size foundries, where the personal supervision of the owner becomes ever more remote consequent upon the time he has to spend on matters other than those directly concerned with manufacturing. He is probably still in competition with both larger and smaller concerns, but to maintain his position *vis-à-vis* the former, he will require technical help in ever-increasing measure. The largest concerns should be able to fend for themselves. Nobody attending the conference can have failed to appreciate the gravity of the problem of the recruitment and training for management.

Correspondence

SPECIFICATIONS FOR IRON CASTINGS

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—The British Standards Institution have published this week two specifications of considerable interest to foundrymen. One is the new standard 2789 for iron castings with spheroidal or nodular graphite, and the other is the 1956 revision of the general grey iron castings specification, B.S.1452.

The issue of the specification for iron castings with spheroidal or nodular graphite is of particular interest to the manufacturers and users of this new material, but it is the other which I particularly wish to bring to readers' notice. The fact that this revision makes no vital alteration to the specification, as the grades are unchanged, may mean that it attracts little attention. Ironfounders should realize, however, that it appears to signify the "beginning of the end" of transverse tests, and in this connection it may be of interest to give a brief summary of the history of development of grey-iron specifications.

In the early 1920s, grey-iron testing was almost entirely limited to transverse-tests, either on bars of 1-in. square section broken at 12-in. centres, rectangular section (2-in. by 1-in.) bars broken at 36-in. centres or 1.2-in. dia. bars broken at 18-in. centres, with occasional tensile tests. The as-cast size of bar from which the tensile test-piece was to be produced was not specified, and some considerable anomalies arose.

The Institute of British Foundrymen played a great part in the drawing up of the original standard B.S.321, which was published in 1926. In this standard, equal prominence was given to transverse and tensile strength, the highest tensile strength stipulated being 12 tons per sq. in. It was completely original in that it introduced three different sizes of test-bar according to the thickness of the casting represented. This specification was gradually altered and improved, primarily under the guidance of the IBF, until the latest edition of the specification for grey-iron castings, B.S.1452, was published in 1948, including a grade requiring a tensile strength of 26 tons per sq. in.

Throughout the whole of the changes that occurred in the specification, the tensile and transverse tests were still considered of equal importance. In this present revision, however, it has been made quite clear that tensile strength is of prime importance. On the other hand, it has been recognized that the cost of preparing tensile-test specimens is considerable, and to avoid this expense, as far as possible, the transverse test has been retained in a subsidiary position as a control test to be used optionally instead of the tensile test, in not more than five out of six consecutive tests on similar materials.

It is to be hoped that all interested either in the control of quality of castings or in their use will study this new specification and realize its implications.—Yours, etc.,

P. A. RUSSELL, B.SC., F.I.M.,
Director.

S. Russell & Sons, Limited,
Bath Lane, Leicester.
November 6, 1956.

DECIBEL REDUCTION

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—It is perhaps a good thing that you "have for a long time resisted the temptation to write about nuisance from noise", as it is apparently a subject which you and I, know very little about. I do know however that a 10 per cent. reduction in volume is barely perceptible by the human ear, and that the decibel scale is a logarithmic one, three decibels reduction being approximately equal to halving the sound level, so that your suggestion that the Allis-Chalmers' expenditure of £930 only resulted in an 11 per cent. reduction of volume is misleading and far from the truth. I would suggest 80 per cent. reduction as being nearer the mark, but as I said, I am no authority on sound and I think it would be a good thing if you obtained expert advice and corrected the impression given by your editorial in the November 1 issue.—Yours, etc.,

F. F. MESSHAM.
A. Messham & Son, Limited,
Preston.
November 8, 1956.

[The object of the editorial was to stress the practical steps taken by an American foundry to reduce noise. Even expert opinion as to what decibels really mean would have conveyed but little to the layman, whereas what was reported certainly does—Editor.]

Public Works and Municipal Services Exhibition

The Public Works and Municipal Services Exhibition, which is being held at Olympia, London, was opened last Monday by the Rt. Hon. Duncan Sandys, M.P., Minister of Housing and Local Government. About 50 of the exhibitors operate their own foundries, whilst most of the others incorporate castings in their exhibits. This factor should be borne in mind at the present time, when the industry is giving thought to the organization of an exhibition to incorporate both foundry equipment and actual foundries. It is obvious that foundry concerns show their products at exhibitions where a high percentage of the visitors are potential customers. Foundrymen visiting Olympia this week will have the opportunity of seeing quite a few displays of municipal castings, some of which now enter into the "precision" range of castings and are a really good advertisement for the industry. There are improvements registered in both cast iron and concrete pipes and the stands showing these are worth visiting. The mechanized road-making machinery much resembles the plant used in a large foundry, but here everything is mobile. It is certainly worth examining by designers with ideas.

Dinner

BRITISH BRONZE AND BRASS INGOT MANUFACTURERS' ASSOCIATION

Mr. F. Baugh presided over the annual dinner and dance held at Grosvenor House, London, W.1, on November 10. The speeches were in the hands of Mr. H. Tarring, Mr. S. W. Platt and Mr. W. J. Hobkirk, J.P., the president of the Association of Bronze and Brass Founders. An excellent cabaret was presented. The organization, perfect in every detail, was carried through by Mr. Platt to whom a presentation was made.

Latest Foundry Statistics

According to the joint *Bulletin* of the Iron and Steel Board and the British Iron and Steel Federation, employment in steel foundries at 20,310 in September, 1956, showed a sudden increase of 480 over the August figure. The weekly average output of steel castings during September was also high at the estimated figure of 7,600 tons; for August the estimate was for only 4,500 tons.

Casting Winder-drum Cheeks*

By *A. W. Bartlett*

So that founders will be able to associate the production of the casting as a component of the finished machine, Mr. Bartlett begins with a description and illustrations of winding engines, their purpose, and general notes on design. The rest of the Paper is a step-by-step account of the production, by loam moulding, of the half-drum-cheek castings of 22-ft. dia., each casting weighing over 20 tons. Successively dealt with are design features and the arrangement to mould the half cheeks in pairs (with splitting cores); corebox design and core-making; bottom-plate construction and mould reinforcement generally, and actual mould making. Thereafter, full descriptions are given of the mould finishing, drying and coreplacing procedures, of running and pouring methods and, finally, of metal composition, cooling and knock-out arrangements. It is clear that the successful production of this type of casting depends on adequate advance preparation, meticulous timing of core production, etc., to suit progress in moulding operations, and careful planning of mould binders and weighting to take account of stresses arising in pouring.

Mr. A. W. Bartlett commenced his career as a foundryman with Vickers, Limited, of Erith, in 1920, and has successively held positions at foundries in Croydon, New Southgate and Wolverhampton. Mr. Bartlett joined the staff of the General Electric Company, Limited, in 1951, as foundry manager at the Fraser & Chalmers Engineering Works, Erith. While in the Midlands, in 1944, he joined the Birmingham branch of the Institute of British Foundrymen and transferred to the London branch in 1951, where he has been a member of Council for several years.

Purpose and Description of a Winding Engine

In most collieries at home and abroad, when coal is cut from the coal face, it is transported to a central point below ground and there raised in cages or skips by a winding engine—a form of vertical lift. In addition to the major task of raising the coal, the winding engine (Fig. 1) is also required to lower men and materials down the pit. In short, such a machine is a vital link in the coal-mining industry. The winding engine (or winder) is a powerful machine requiring several thousand horsepower to drive, reliable and safe—a precision job throughout.

Some machines are directly driven by a motor and some drive through gears. In older installations, the winding engine is driven by steam, but to-day, at an ever-increasing rate, these steam winders are being replaced by electric drives.

There is a further type of friction winder in which the ropes are merely laid over the drum on a Ferodo bedding and not coiled round it, but as the majority of these are fabricated, a description of this type forms no part of this Paper.

The principal part of the winder (apart from the drive) is the drum around which the rope is coiled, and from each end of the rope are suspended the cages or skips. The drum shell consists of grooved steel plates which are carried on end-members known as drum cheeks, which are in turn mounted directly on to the main shaft. These drum cheeks are usually of cast iron, although occasionally they have been made in steel. Each drum cheek consists of two halves, and their general appearance can be seen in Figs. 2 and 3. A further important part of the machine is the brake gear, required to hold cages or skips at the top, intermediate level, or the bottom of the shaft. The brake gear consists of large shoes of wood carried on large fabricated arms, although Ferodo linings are becoming increasingly used in place of timber. Two of these shoes can also be seen in the illustration. It will be noticed that these shoes impinge on the steel path mounted on the drum, and beneath this path, the drum cheek is serrated—the serrations providing air gaps which help to cool the whole arrangement while braking is taking place.

There are various types of drum—cylindrical, bi-cylindro-conical, single and double drums. Fig. 2 shows beyond the drum cheek, the bi-cylindro-conical drum. On this, a large raised helix takes the rope from a smaller to a larger diameter and *vice versa* when the direction of rotation is reversed, thus enabling the speed of hoist to be increased (or decreased) without changing the speed of rotation of the drum. This is another complicated foundry job. Finally, comes the control gear to enable the driver to operate the winder on signals from the face and pit-head.

Winder Design

When specifications are first prepared by the customers, such details as output per hour (which varies from around 100 to upwards of 750 tons per hr.) are considered. The depth from which the coal is to be wound is also a vital factor, and

*A Paper read before the London branch of the Institute of British Foundrymen, Mr. F. Hudson, F.I.M., presiding.

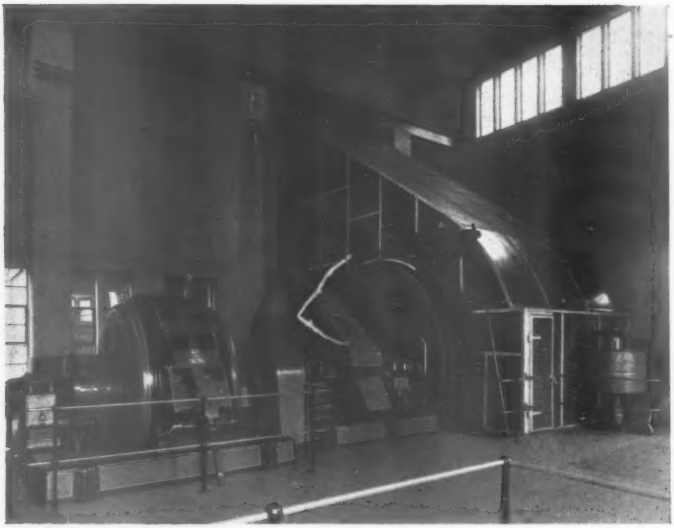


FIG. 1.—*Winding engine incorporating castings of the type described. It is used at the pit-head to raise and lower men and materials.*

other subsidiary matters, such as intermediate-level winding, are also concerned.

The winder is then designed in a specialist department and all drawings are issued from the department's drawing office. Since winders are "one-off" jobs, each is drawn individually. While the drawings are being made, the foundry is often consulted on different aspects so that the final design may eliminate any snags from the foundry point of view, and by far the largest proportion of the winder is made in the foundry—the only major portions being made outside the shop are the shaft, the drum plates and the brake shoes.

Moulding the Drum Cheek

Fig. 3 shows the detail of the drum cheek, and, as shown in the drawing, each half of the cheek is made up of two complete ribs and two half-ribs at the joint, which carry a fairly heavy rim. The rim consists of two horizontal flanges and one vertical dividing flange; on the shorter of the two horizontal flanges, which is approximately 6-in. wide and 2-in. thick, the drum shells are finally mounted and bolted. On the outer and wider flange, which is approximately 15-in. wide and about 2-in. thick, the brake path is mounted and bolted. In the illustration, serrations can be seen all round the cheek, the grooves being about $\frac{1}{4}$-in. deep and the serrations about 3-in. wide. Bosses have to be provided in the central hub and in the joint ribs, to allow the two halves to be bolted together. When the drawings are issued, the patternshop and the foundry managers consult each other with regard to the method to be adopted on the moulding of the job, either in sand or loam for the mould, and oil sand or loam for the cores. If the mould is made in loam, only a strickle-board is required, with the coreboxes—mainly collapsible ones—made in the usual manner (Fig. 4).

The castings generally depicted in the illustrations throughout this Paper, were made in loam owing to their size of 22-ft. dia., which was too big for the existing drying ovens in the Author's foundry. It will be appreciated, of course, that although drum cheeks are in halves, the mould is formed to cast two halves together with splitting cores in between.

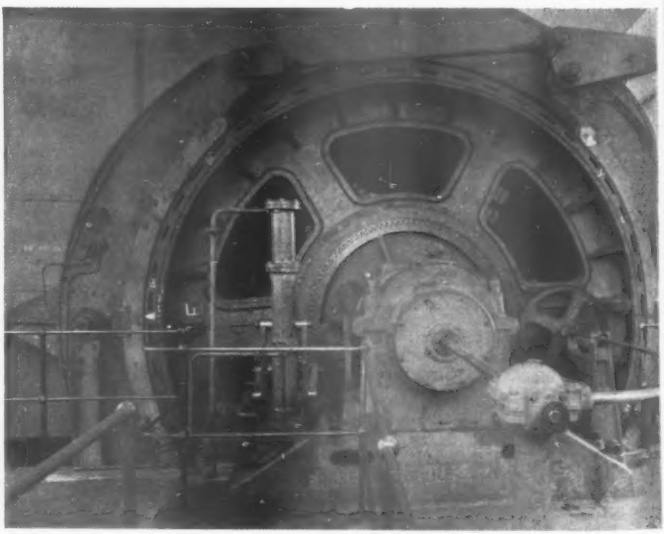
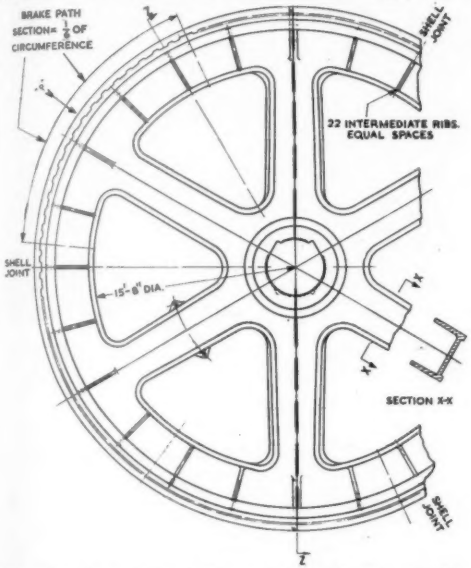


FIG. 2.—*Winding drum showing the brake gear required to hold cages or skips at the top, intermediate level or at the bottom of the shaft. Two brake shoes can be seen in the illustration.*

Only one corebox was made, for the forming of a half core. As shown, the corebox is for the right-hand half of a top core. When the right-hand half was made, the internal members of the box were changed to the other side, to form the left hand. For the bottom cores, the same corebox frame was used, but in a different interior. When the pattern arrived in the foundry, a suitable site had to be selected to mould the castings, and



when one is cramped for space, and the mould measures 27-ft. across, this problem can be quite troublesome.

Bottom Plate Details

The bottom plate itself, consisting of four quadrants, measures 25-ft. in overall dia., is 6-in. thick and weighs approximately 50 tons. These must be laid perfectly level in order to build up the mould from them. In order to do this, the site is first thoroughly dug over, levelled by long steel levelling strips, and finally adjusted with a carpenter's large spirit level,

When the plates are levelled, the centre is set in position; this consists, in fact, of a double centre, comprising a cast-iron plate with two tapered holes machined in it, 6-in. apart, to take the spindle from which the mould is struck up. This is in order to allow sufficient material for each half to be machined and to be mated to form a complete drum. It must be perfectly upright for accurate working and for taking measurements when required.

One half of the mould is built first (Fig. 5) and then the spindle is changed to the other hole in the centre and then the second half of the mould is built. The bricks used in the construction of the mould are sand and lime bricks as they are quite porous and help to absorb some of the moisture out of the loam. The loam which consists of two parts of returned black sand, one part of Erith loam sand, and cow hair for binding, is milled in an ordinary pan-mill until the right texture is developed; this loam is also used between the bricks for building the wall.

As the wall is built around the plates, ¾-in. outside the strickle is allowed for the finishing coat of loam. About 12 in. from the top of the mould, binder plates are bedded into the wall. These can be seen

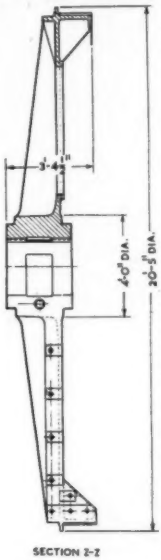


FIG. 3.—*Diagrammatic view of the drum cheek showing that each half of the cheek is made up of two complete ribs and two half-ribs at the joint, which carry a fairly heavy rim.*

in considerable detail in Fig. 6. They make up a complete ring in four segments, each is about 9-in. wide, 3-in. thick, with a row of elongated holes 3-in. long by 2-in. wide, and 2-in. from the outer edge. The binder plate protrudes 5-in. into the brickwork so that the outer edge of the brickwork corresponds closely with the inner edge of the line of holes. Similar holes are cast in the bottom plate on which the whole mould is built and vertical reinforcing bars of cast iron are threaded through the top and bottom holes, and bolted firmly in position by means of wedges driven in behind. These help to

FIG. 4.—*Collapsible corebox used for producing the windows in the drum cheeks. Splitting cores are used to separate the two halves.*

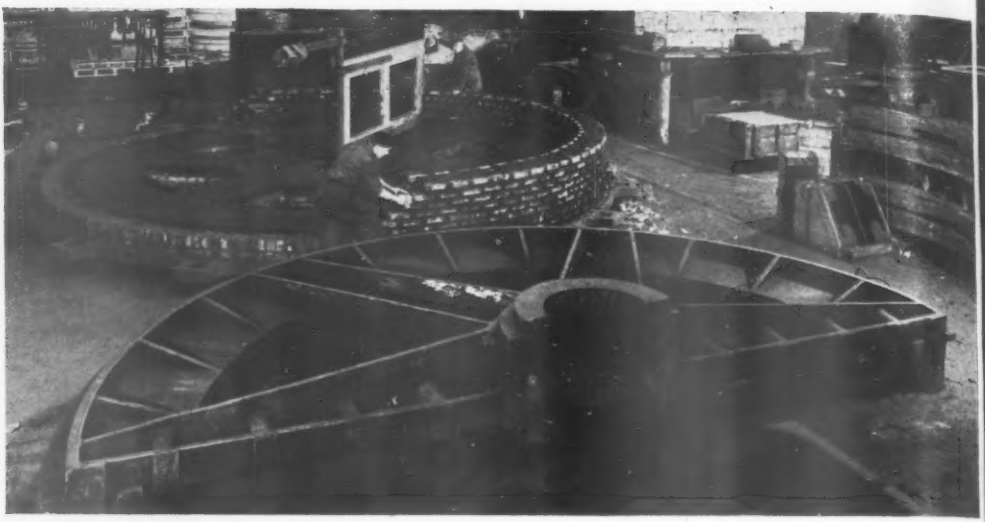


FIG. 5.—*Construction of the mould in sand and lime bricks with loam used between the bricks in the building. In the foreground is a finished casting on one half of the drum cheek.*

reinforce the brickwork when wet, and also help to take the strain when casting the job.

Finishing and Drying

When the mould is built, the finishing coat of loam is applied to the sides, and also 1-in. of loam on the bottom, for it is here where the coring-up commences.

In the case of the drum cheek which, as shown in Fig. 3, carries the brake path, the serrations have also to be cast on. This is done by the moulder who first of all marks the position of the serrations round the periphery of the mould with trammels. The mould has been finished to the smallest diameter required, and when the position of the serrations has been marked, the moulder then offers up a small piece of pattern the shape of each groove, which he proceeds to bed in around the top edge of the mould. Similar plates to the bottom plates are then strickled with loam and placed on the top of the mould enclosing the whole area. Portable driers are then placed on top to dry the mould which takes from 14 to 18 days at 20 hours per day. These portable driers are an ordinary type of coke-fired job, containing approximately one cwt. of coke at a time, as seen in any foundry up and down the country.

When the mould is dried, the top plates are removed and the mould is checked for size, rubbed down, and three coats of blacking applied. The top plates are replaced and a further 24 hours is required to dry the blacking. The top plates are again removed, and the mould is marked out from

FIG. 6.—*Binder plates bedded into the wall making up a complete ring in four segments. The binder plate protudes 5-in. into the brickwork so that the outer edges of the brickwork correspond closely to the inner edge of the elongated holes.*

FIG. 7.—*View of the mould showing the splitting cores in position and a window core being placed.*

the centre lines for the positioning of the cores.

The cores are made in oil sand, and owing to their large size, are made in 12 sections for the bottom layer and 12 for the top. Each core is checked for accuracy and must conform to the lines marked on the mould (Fig. 7).

The bottom cores are next placed in position and finally checked for metal thickness. The top cores are then positioned and checked for metal thickness, chaplets and denseners are placed as required, air vents checked and the mould is ready for closing.

The split cores for making a split between the two halves can also be seen in Fig. 8. Arising out of this is the interesting fact that the first two castings proved to be oversize. A very careful check was made of all the pattern equipment and the coreboxes, to see where such an error could have arisen, but no dimensional fault could be found in them. After thinking it over, it was wondered whether the use of oil-sand cores with a loam mould might result in some difference in contraction. An experiment was therefore carried out with an oil-sand core of roughly the same dimensions and consistency, and it was found that the contraction resulting from the use of this core, was roughly half of the normal iron contraction. The coreboxes were therefore lined with material $\frac{1}{8}$-in. thick and the cores from this used in the next cast. These came out correct to drawing size and since then there has been no trouble of this nature.

The top plates are then placed in position, and bolted and cottered down. On top are placed weights to the extent of another 50 tons, making a total top-weight of roughly 100 tons. The method of cottering can be seen in Fig. 9, and in addition, a dark line can be noted running round the middle of the mould—this is, in fact, a steel chain with $\frac{3}{4}$-in. dia. links, which is ribbed and tensioned as an additional safeguard against pressure.

Running Methods

The castings are run on the centre boss and consist of two 4-in. dia. downgates with three risers off each casting on the outside edge.

Some difficulty was experienced in putting the runner basins in position owing to the use of two ladles to cast the job, but they were placed at right angles to each other, and placed one on top at the end where the downgates were positioned. The two ladles used had a capacity of 11 tons in one and 15 tons in the other (Fig. 9). The metal was melted in two balanced-draught cupolas and careful timing of the melt was calculated, as one furnace melts 5 and the other 7 tons per hour. The melt thus occupied $2\frac{1}{2}$ hours. The amount of pig-iron and scrap was weighed and the specification carefully adhered to with test-bars and specification blocks. The composition was as follows:—T.C. 3.34; Si. 2.10; P. 0.87; S. 0.11; Mn. 0.63.

When the metal was ready

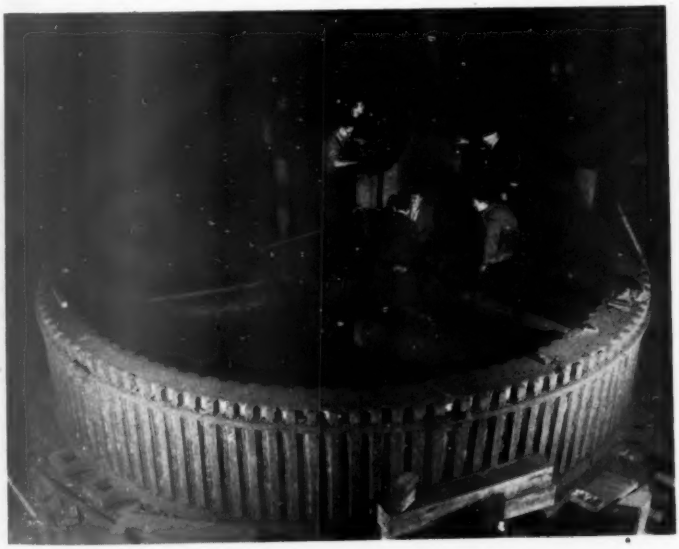


FIG. 8.—*Another view of the mould and split core showing further core-placing operations.*

FIG. 9.—*View of the two ladles, one of 11 tons and the other of 15 tons, used for pouring a pair of winder-drum half-cheek castings.*

for casting, the temperature readings were between 1,260 and 1,280 deg. C.; then the ladles were skimmed and taken to the mould.

Two gangs of men were employed on pouring the metal and the Author supervised the process from the middle of the mould. The smaller ladle started to pour first and when this was half-empty, the larger ladle commenced. As soon as the smaller ladle was empty, the crane moved away leaving the space clear. The whole casting time was about 5 min., and when both ladles were out of the way, rod feeding commenced, which lasted for about one hour. After about three hours, the weights on top were removed, this was to allow the castings free contraction.

After about three weeks, the mould was dismantled, and all the bricks cleaned and stacked for further use. The top layer of cores was then removed and one half of the casting taken to the fettling shop. When this had been trimmed, and been sent to the machine shop, the same procedure took place with the other half, which was also despatched to the machine shop.

The bottom plates were cleaned off and ready for the next pair of cheeks, as this particular order required four halves. In the case of a double-drum winder, there are eight halves. This was altogether a most interesting job from a foundryman's point of view.

Acknowledgment

The Author expresses his gratitude to the management of the Fraser & Chalmers Engineering Works of the General Electric Company, Limited, for permission to publish this Paper.

Institution of Metallurgists

The Institution of Metallurgists held its annual refresher course this year at Llandudno when over 250 members, a record number, attended. The general theme of the course was the effect of temperature on metals. The first session was devoted to two papers—the first by Dr. N. P. Allen (National Physical Laboratory) on the "Engineering Properties of Metals at High Temperatures," in which he gave a most valuable resumé of the basic factors of creep, scaling, fatigue and other properties as affected by temperature. This was followed by a paper by Mr. W. E. Bardgett (United Steels Research Laboratories), "High-temperature Steels," in which the author drew on the extensive researches carried out in his own laboratory and elsewhere.

The second session of the course was devoted to two papers on the non-ferrous metals, the first by Dr. L. B. Pfeil (Mond Nickel Company, Limited), who dealt with developments in the heavy non-ferrous metal field, in his paper "High-temperature Non-ferrous Materials." The second speaker was Mr. George Meikle (Royal Aircraft Establishment, metallurgical department), who dealt with the light metals in a paper "Behaviour of Certain Metals at Temperatures up to 450 deg. C." In addition to the technical sessions, a visit was paid to the works of Aluminium Corporation, Limited, at Dolgarrog, where the production of aluminium sheet and strip, the blanking of circles, and the production of special finishes was seen. On Saturday evening there was a film show which included the colour film "The Kitimat Story."

Swedish Iron and Steel Production

More detailed information has recently become available of Swedish iron and steel production in 1955.

Regarding pig-iron, out of 1,170,000 tons only 75,000 tons were charcoal iron and 150,000 tons the product of electric furnaces. In the production of high-grade steel, sponge iron is gradually replacing charcoal iron in the steel furnace charge. In 1955, the output of sponge iron was 74,000 tons; expansion to 100,000 tons is expected during the current year. So-called "Lancashire iron" is now scarcely more than of historic interest, the output last year being only some 2,000 tons. Of the total steel output of 2,130,000 tons, some 1,650,000 tons comprised ordinary steel and 480,000 tons quality steel. Electric-furnace steel represents the largest item of production, being 647,000 tons of ordinary steel and 165,000 tons quality steels. Including electric induction furnace output of 107,000 tons, total electric furnace output was 919,000 tons, representing 43.9 per cent. of total ingot output.

The most important development in the past 10 years is in the production of converter steel, both acid and basic-Bessemer, which last year together was 400,000 tons, being an increase of 3.5 times compared with 1946. Finished rolled steel output in 1955 included: steel bars, 758,000 tons; sheets, 292,000 tons; wire and strip, 187,000 tons; tubes, 123,000 tons, totalling 1,360,000 tons.

SINGER MANUFACTURING COMPANY, LIMITED—Mr. John D. Baillie has been appointed managing director and chairman in succession to Mr. R. L. Hoffmeister.

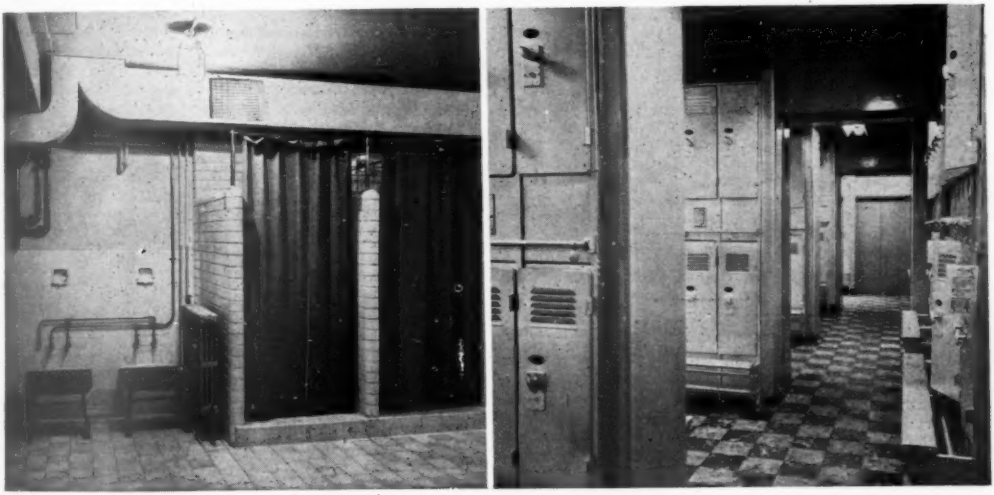
New Washing Facilities at Whitworth's Gateshead Foundry

Armstrong Whitworth (Metal Industries), Limited, have recently completed the installation of new shower-baths and locker rooms, Fig. 1, at their Close works, Gateshead, and it is hoped that this short description will assist other foundries in their installation of similar amenities. The amenities were planned on the ground floor of a former office building and the internal planning was consequently dictated by the existing structure of this building. The materials chosen were as follow:—Langley clay tiles with matt finish for the floors of the shower rooms; Thermoplastic tiles for those of the locker rooms; 4½-in. white, impervious, glazed tiles for the shower walls with the upper part coated with anti-condensation paint.

Individual wash-basins were chosen in preference to circular communal basins, to fit the layout, but a further factor was, of course, economy of the use of water. Enough room has been allowed for the future extensions of the amenities if necessary to cope with any increase in the number of employees. At the moment, there are 306 heated clothing lockers—approximately two to every foundry employee—thus providing one locker for working clothes and the other for off-duty clothes. There are 16 showers, six wash-basins and four foot-baths. Individual changing-rooms are provided for disabled persons and the whole suite of shower and locker rooms, control office, changing rooms, etc., are central-heated by a gas-fired boiler with clock control.

The architect was Mr. R. Collins, A.R.I.B.A., A.M.T.P.I., of St Hilda Street, South Shields. The main contractors were Bewley & Scott, Limited, of Dunston-on-Tyne, 11, who were responsible for the structural work. Elsy & Gibbons, Limited, the main sub-contractors, of Havelock Street, South Shields, were responsible for the heating and other installations.

FIG. 1.—*Interior views of the new ablution block erected by Armstrong Whitworth (Metal Industries), Limited. One illustrates a section of the showerbath accommodation and two of the foot-baths (note the overhead ventilation trunking) and the other shows how the double-tier lockers are arranged, one for working clothes and the other for off-duty clothing, for each person.*



French Steel Industry Modernization

Some details of the third modernization plan for the French steel industry have been announced by the Groupement de l'Industrie Sidérurgique. In this third stage of modernization to be undertaken in five-yearly plans since 1945 it is intended to raise the output of ingot steel in France to a level of 17,000,000 metric tons in 1961 at an estimated cost of 22,500 million fcs. (£22,500,000). At the present rate of production the steel output in France this year should reach 13,400,000 metric tons.

The sum to be spent on new investment will be divided as follows:—Coke ovens, 14.5 per cent.; blast furnaces (and ore-preparation plants), 25.6 per cent.; steelworks, 11.3 per cent.; rolling mills, 30.9 per cent.; various undertakings, 12.7 per cent.; social and housing projects, 5 per cent.

British Columbia Rail Order

Latest of several substantial orders placed in Britain by the Pacific Great Eastern Railway is a contract worth over $4,000,000 (£1,500,000) for permanent-way materials. The Pacific Great Eastern is the Canadian Government-owned line in British Columbia. It runs over 500 miles from north Vancouver to Prince George, and is in process of being extended a further 259 miles to Dawson Creek and Port St. John in the north-eastern corner of the province. The contract includes 27,480 tons of rails, angle bars, and tie plates. Among British firms participating are:—Dorman Long (Steel), Limited; Colvilles, Limited; the South Durham Steel & Iron Company, Limited; the Skinningrove Iron Company, Limited; and the Workington Iron & Steel Company (branch of the United Steel Companies, Limited).

H

British Standards Institution

Listed for future publication by the British Standards Institution are: No. 1452:1956 Grey-iron Castings; this to cost 4s.; No. 2783:1956 Gamma-ray Source Capsules for Radiography (2s. 6d.) (see below) and No. 2789:1956 Iron Castings with Spheroidal or Nodular Graphite (3s. 6d.). The list of "New Work Started" includes tyres and wheels, axleboxes and brake-shoes and blocks for railway rolling stock. Reprints are now available of standard No. 1121—Methods for the Analyses of Iron & Steel, Part 11 (Carbon in Steel and Low-carbon Ferro-chromium, 2s. 6d.) and Part 12 (Silicon in Acid-resisting High-silicon Iron, 2s. 6d.); No. 2B8:1930—Phosphor-bronze castings for bearings (1s. 6d.). The list of draft standards circulated for comment contains CW 8488: Sampling of coke (revision of Part 2 of BS 1017); CW 8553: Method for the determination of iron in aluminium alloys; CW 8554 and CW 8555: Methods for the determination of manganese in aluminium alloys; and CW 8791: Magnesium and magnesium-alloy ingots and castings for general engineering purposes.

Isotope Holders

Published this week is a new British Standard: Gamma-ray Source Capsules for Radiography (B.S. 2783) (price 2s. 6d.). This standard has been evolved in close collaboration with the Atomic Energy Research Establishment and the Radio-chemical Centre. It deals with two designs of cylindrical capsule required in industrial radiography for the convenient holding of radioisotopes. Activated material such as caesium or radon, in the form of a small cylinder, is placed within the inch-long capsule, the open end of which is sealed after the insertion of the radioactive source. The "tongue" of the capsule provides a convenient means of handling at safe distances, and gives a convenient surface on which an identification symbol may be stamped.

B.S. 2783 provides fully dimensional diagrams illustrating the two types of capsule; notes are included as to suitable alloys for their manufacture.

IAESTE Annual Report

The annual report of the International Association for the Exchange of Students for Technical Experience once more records an increase in the number of students participating which last year totalled 5,711. Mr. James Newby of the Imperial College, London, who has been general secretary for the last eight years, is resigning and his duties are being assumed by Mr. R. A. Beijer (Box 5796, Stockholm 5, Sweden). The foreign student has a wide choice of UK foundry concerns wherein he can work during his vacation, whilst equally there are considerable numbers of like establishments open to the enterprising United Kingdom undergraduates.

Mechanical Engineer's Contribution to Clean Air

Sponsored by the Institution of Mechanical Engineers, a conference on the "Mechanical Engineer's Contribution to Clean Air" is to be held in the Central Hall, Westminster, from February 19-21, 1957. Papers will be presented on dust control and fuel combustion in various industries, the purpose of the conference being to pool knowledge and experience, and to enable the advice given and the principles established to be used to the common good. Prof. M. W. Thring and Prof. R. J. Sarjant will give a paper on "Dust Problems of the Iron and Steel Industry."

Brighter Future for Railways

Economists, or at least a certain section of them, have from time to time pointed out that the British railway system can never, for a number of reasons, be a profitable proposition. They do not deny that the railways are an integral part of the national commercial fabric and that they must be made and kept efficient. In short, that instead of regarding British Railways as a source of comfortable profits, they should be viewed in the same light as the maintenance of highways or street lighting. The Government would seem to think otherwise.

By offering to cover annual deficits until the early 1960s, when the benefits of modernization will be felt, it has given tangible proof of confidence in the possibility of restoring the finances of the British Transport Commission. Over the signature of Sir Brian Robertson, chairman of BTC, a White Paper presented to Parliament recently summed up the situation in the words: "It is not a matter of rescuing a moribund concern from ruin, but of enabling one with a sound, even bright, future, to pass through this difficult period without being thrown into hopeless disarray."

Part of the four-point programme is the plan to replace steam traction by electricity and diesel power. Coach stock is to be redesigned and a new type of diesel train of high speed and special amenities and a small diesel rail car for stopping services in rural areas are envisaged. Also the freight service is to be modernized and together they would show an improvement of £85,000,000. The movement cost of a multiple unit diesel is only a third of that of a steam stopping train and the magnitude of economies which can be effected by modernization can be grasped.

S and L — ISHRA Deal

It was announced on October 31 that Stewarts and Lloyds, Limited, had bought from the Iron and Steel Holding and Realization Agency the entire issued share capital of Kettering Iron & Coal, Limited, and of the New Cransley Iron & Steel Company, Limited, together with 25 per cent. of the issued share capital of the Loddington Ironstone Company, Limited, for the sum of £260,000. In addition, the agency has received a special distribution of £240,000 out of the reserves of Kettering Iron & Coal. The total proceeds accruing to the agency are therefore £500,000.

The agency's investment in the shares sold, represented by compensation under the Iron and Steel Act, 1949, was £456,925. Twenty-five per cent. of the Loddington Ironstone capital is already held by the New Cransley Iron & Steel Company; the agency retains a 50 per cent. holding in Loddington Ironstone.

Zinc Development Association

Much of the recently issued annual report of the Zinc Development Association, is devoted to an illustrated description of the new headquarters at 34, Berkeley Square, London, W.1. It is certainly an interesting, nicely-furnished and well-laid-out building. The Association is based on an information service, and almost 5,000 enquiries were received during 1955. The report carries an interesting table of the industrial consumption of zinc in Great Britain. Last year, 121,000 tons went in to the making of brass in all its various forms. Die-castings consumed 41,500 tons, and galvanizing 107,000 tons. The certification scheme for zinc-alloy die-castings, launched in 1954, is reported to have become well established.

Solubility of Hydrogen in Iron/Carbon/Silicon Alloys*

Discussion of the Paper by Mr. V. B. John and Mr. T. Evans

The Authors described their work, reported in the Paper, as a continuation derived from earlier research presented to the Institute at its Glasgow conference two years previous. Several speakers in the discussion stressed the likely practical value which, in time, would derive from these efforts. Further collaborative research was reported, the rôle of graphite being commented upon. Problems which still remained awaiting elucidation, it was said, included the source and atomic nature of the gas evolved from the metal; the mechanism of the effect of silicon, analogy with welding and application of the research to such phenomena as malleablizing reactions. It was put forward that an extension of such work in co-operation with the universities was very desirable and that means should be sought to provide continuity both in finance and the right sort of research worker.

THE CHAIRMAN at this session of the conference, Mr. A. E. Peace, in his introductory remarks, said he had a particular interest in the Paper and in the work reported (which had been done at University College, Cardiff) because he was chairman of the Technical Council of the Institute. It was interesting to recall that the work had stemmed from inquisitiveness within the Institute's membership, first of all voiced by Dr. J. E. Hurst. One had expected to see Dr. R. V. Riley present at the meeting—and indeed he was present—for he had been associated with Dr. Hurst in much of the early work on gas analysis of cast iron. This pioneer work had eventuated in the setting up of a joint committee of the Institute of British Foundrymen and the British Cast Iron Research Association, a committee which was productive of very good research work, particularly in dealing with the subject of the solubility of hydrogen, which had previously been rather neglected for a number of years and had not developed in the way the ironfounding industry desired. It was very creditable that the work described in the Paper had been done at Cardiff, it was work which involved extremely complicated and difficult experimenting.

Authors' Introduction

MR. T. EVANS said it was a very great pleasure for him to present the Paper. Some of the finances for the work described had been provided by the Institute, while the British Cast Iron Research Association had helped to a very great extent by providing particularly pure samples of the alloys with which the research had been carried on, and the investigators had had the benefit of a great deal of help from the joint committee of the Institute and the BCIRA.

The need for the research had arisen, he believed, because of the fact that for some reason or other a number of practical ironfounders had thought that the hydrogen that went into solution in their alloys might be a certain amount more than in normal steel, and this might be an explanation of some of the practical difficulties of founding.

When the work was started, some years ago, there had been very little information available on the equilibrium solution, at various temperatures, of hydrogen in ferrous metals. There was available a great deal of classical fundamental work, and in the paper[7] that was presented to the Institute at its Glasgow meeting in 1954, an investigation of the equilibrium solution of hydrogen in very pure iron/carbon alloys had been dealt with, the work being done under the same control as that described in the present Paper. As an addendum to that earlier work values for the ternary system iron/carbon/silicon were requested and the present Paper gives details of this work.

It was a very unspectacular Paper, said Mr. Evans. If it had merit it was that the Authors had attempted to determine as accurately as they possibly could the equilibrium hydrogen solubilities in what were, so far as he could see, the purest form of iron/carbon/silicon alloys. The results were always interesting, in that they were new and, he hoped, reasonably accurate. Apart from the fact that it did seem proven that carbon effected the solubility of hydrogen in iron to a slight extent, as was shown in the first paper, the present work suggested that the addition of silicon worked the other way, possibly not to the extent that might have been expected, but it did depress the hydrogen solubility, though there had to be quite a lot of silicon to do so. That appeared to be the conclusion to be drawn from the present Paper.

MR. V. B. JOHN then presented a summary of the Paper and also acknowledged the help which University College had received from the Institute and the BCIRA. He expressed thanks to professor Jones, of the University College, for affording facilities for the research.

DISCUSSION

Nature of the Dissolved Gases

DR. J. T. BERRY (Royal Naval Scientific Service, NCRE, Dunfermline), prefaced his contribution by saying that all should pay tribute to the very careful and very patient work done at University College Cardiff. Having had some experience of high-vacuum research, he knew there were lots of heartaches. Mr. John and Mr. Evans had suggested that the slowly diffusing constituent they met with

* Paper presented at the Cardiff conference of the Institute of British Foundrymen and published in the JOURNAL August 23, 1956.

was either molecular hydrogen or methane. With a co-worker, Mr. F. C. Allan, he himself carried out a few experiments dealing with hydrogen diffusion at room temperature which he would like to describe, but he felt that it would be opportune to begin by considering what happened in the evolution of hydrogen from weld deposits. In the welding industry, for some years research workers laid down weld specimens and having put them into a vacuum-extracting device had measured residual hydrogen. It had been assumed that the diffusible hydrogen (*i.e.* atomic hydrogen within the lattice) had been moved previously and it was further assumed that the residual (molecular) hydrogen was subsequently removed by heating at 600 deg. C. for one to two hours. This would appear to be confirmed by theoretical studies of diffusion mechanism.* This seemed to indicate that this very slowly diffusing constituent was most probably methane, which was decomposing and eventually forming atomic hydrogen, or that it was the outgassing of the graphite with which the slowly diffusing constituent was associated.

He and his colleagues had thought that, in addition, the combined-carbon content might have some effect on hydrogen "diffusibility." They had noted the work of Bach, Dawson and Smith† of the BCIRA in which the evolution of hydrogen from white and grey cast irons at room temperature was measured; very slow evolution over periods up to six months or even longer had been observed. Dr. Berry said that although a thermal charging device was not available at NCRE they had charged electrolytically several iron/carbon alloys, including one supplied by the BCIRA and Armco iron. Although the research association's results for the diffusion of hydrogen at room temperature from white cast iron had shown that the flow was very gradual, it was found that when the alloys were charged under reproducible conditions to a much higher content of hydrogen—which probably could be done only electrolytically at room temperature—there was very little difference in the type of evolution curve, whether from Armco iron or a white cast iron. All curves started to flatten out after five days (see Fig. A).

This would seem to indicate a change of diffusion coefficient with concentration of hydrogen. He was suggesting that, as the concentration of hydrogen increased, the type of diffusion curve changed from something apparently parabolic to something very definitely exponential, (see Fig. B).

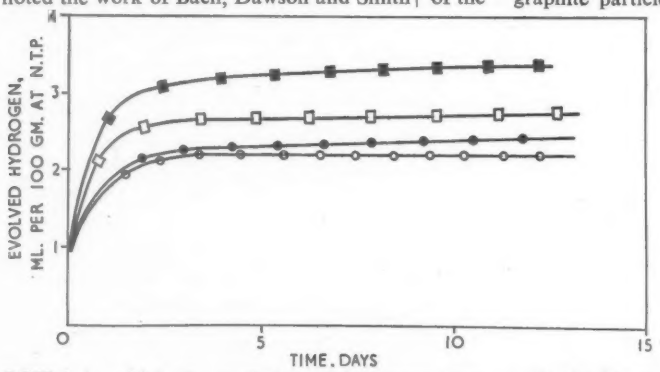


FIG. A.—*Evolution of hydrogen from various iron/carbon alloys at room temperature.*

Key: ■ — ■ 0.9 per cent. C; □ — □ 3.25 per cent. C (0.69 per cent Si); ● — ● 1 per cent. C; ○ — ○ 0.035 per per cent. C; all specimens cylindrical 8 mm. dia., 25 mm. long, charged cathodically at 2 amps. per sq. cm.; all previously degassed at 600 deg. C; evolution into modified BCIRA-type bottles.

Possible Rôle of Graphite

MR. JOHN said that both Mr. Evans and himself were in agreement with the remarks made by Dr. Berry. The question of hydrogen diffusion and also of the form of hydrogen within the metal was something about which they did not know a great deal; they were not concerned so much with that aspect of the work, but they did know that it took longer to outgas a grey iron than to outgas a white iron. They had assumed that that was due to quite a considerable amount of the hydrogen in the grey iron being present either in the molecular form or in the form of methane, and that this molecular hydrogen or methane was contained in voids surrounding graphite particles or within the graphite itself; in fact they attributed the slightly higher hydrogen solubility in grey iron to occlusion around graphite particles.

In the Paper it had been stated that the Authors were obtaining some methane in the extracted gases, and he pointed out that such methane could not have been diffusing out from the metal, but was merely methane formed due to the interaction between hydrogen and carbon at the surface of the metal after atomic hydrogen had diffused out through the metal.

In Fig. 13 was shown the slightly different diffusion rates or, should he say, outgassing rates with one particular alloy when it was in the white state (curve 1) and when it was in the grey state (curve 2). The difference was not particularly great, but it was believed that the slower rate of outgassing in the second case was due to some of the hydrogen being contained within the metal as molecular hydrogen or as methane.

Referring to the top portions of the curves (in curve (1) from roughly the 3-hour point onwards,

* Demarez, Hock and Meunier, *Acta. Met.*, January, 1954.

† Bach, Dawson and Smith, *Jnl. Res. Dev.*, BCIRA, December, 1954.

and in curve (2) from approximately the 5½-hour point onwards), there was still a continual rise, *i.e.*, hydrogen was still coming out, but the amount coming from the metal itself was exceptionally small, the major portion being attributed to the leak rate of the tube. At the same time, it was not credited that after eight hours of extraction all the hydrogen had been removed from the metal, but in all probability 99.9 per cent. had been extracted; there would still be some left, but the point was being reached where the hydrogen concentration within the metal was so slight that its diffusion rate outwards was exceptionally slow. He was of the opinion that, if the extraction were continued for a period of some 24 hours, the net gain in gas extracted would not have been more than 0.1 ml., and in all probability it would have been much less.

Rewarding Results

DR. R. V. RILEY said he had intended to raise several of the points which Dr. Berry had already put over very clearly, and to which the meeting had received very adequate answers from the Authors. Members had by now come to expect to have an interesting paper emanating from University College, Cardiff, and the industry had a very high opinion of the standard of work carried out there. It was very painstaking and fundamental and it was work which, he thought, could only be done adequately in a university department.

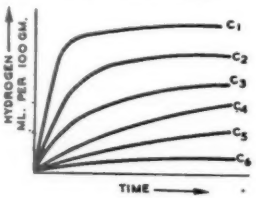


FIG. B.—*Schematic family of curves of evolution of hydrogen in ferritic alloy; C indicates hydrogen concentration,* $C_1 > C_2 > C_3 > \text{-----} > C_n$.

The results were adequate recompense to those who had had the initial idea that work of this kind should be carried out. There had been a tendency, ten years ago, to feel that all the fundamental work on hydrogen in ferrous metals had been done in the case of steel and, therefore, all that one need do was to interpret this for cast iron. However, the work now presented had shown conclusively that one could not interpret data relating to steel directly to cast iron. The influence of the graphite, for instance, was most interesting; in some respects it behaved as one expected it to do, but he did not think anyone would have been sufficiently bold to forecast the results until the experiments had demonstrated them.

Therefore he felt that the most important part of the work was the conclusive proof that the hydrogen in cast iron came from two sources; there was the interstitial hydrogen, of an atomic character, and the molecular hydrogen present in the voids or adsorbed on the carbon in the graphite in some way.

He understood that Mr. Evans was having considerable difficulty in finding another collaborator, but he hoped that eventually the work would be carried on, and he suggested that it would be interesting to examine in more detail the gases coming from the iron. In the particular work described by the Authors, pure hydrogen and iron/carbon alloys of very high purity had been used; it might be desirable to study the behaviour of the pure alloys when, instead of just hydrogen being present, there was hydrogen and carbon monoxide; and possibly, hydrogen, carbon monoxide and nitrogen. In earlier work, he had obtained some results which had seemed rather surprising—they were recorded in a paper presented by Dr. Hurst and himself to the Institute at the Cheltenham conference in 1949. The gases from commercial cast iron had been vacuum extracted at temperatures of 500, 600 and 800 deg. C. At 800 deg. C. a typical gas sample from a grey phosphoric foundry iron consisted of CO about 40 per cent., hydrogen about 50 per cent., and nitrogen represented the balance. If one vacuum-heated steel, one obtained hydrogen only, but from cast iron one obtained CO and nitrogen in addition to hydrogen.

Sources of Gases

As to the sources of those other gases, he said it was generally agreed that the CO could not diffuse through the solid; so that also might be associated with graphite in some way—it would not be surprising, because it was known that hydrogen and CO were always present in commercial graphite and could be evolved in small quantities along with hydrogen whenever graphite was heated. Did all the carbon monoxide come *via* this mechanism? If so, what was the source of the nitrogen? These questions could only be answered adequately by experiments of the high quality now being carried out at the University College.

MR. EVANS confirmed that the work described was done with pure samples, and those samples were outgassed for many days before they were treated with hydrogen; so that there would be no chance of any CO entering.

The second point was that the outgoing gases, on analysis, had followed almost the equilibrium rule for methane, *i.e.*, outgassing at the lower temperatures gave more methane; at 600 to 800 deg. C. there was more methane than at 1,000 deg. C., and at the latter temperature it was almost non-existent. It seemed, therefore that the methane in the hydrogen must have come from the outside of the test-piece. But the theory that methane was within the test piece, in the graphite, and had to dissociate first of all and then creep through, might still hold good.

Further work on the subject was very much in the minds of those at University College. Like all other institutions which were doing research work, however, they experienced very great difficulty today in getting suitable research students. His own view was that the work was worthy of appointing in

some way a permanent research worker on a higher level than a student who was being trained; at Cardiff they trained the student and got him to do such work afterwards.

MR. H. G. HALL, F.I.M., re-emphasized the value of the work described in the Paper. Those who were really keen on that work, he said, had realized that it would be a very long time before answers were obtained to theories glibly put forward when the joint Gases Committee had started work. In his opinion, it was another section of the jig-saw which had to be built up before one could put together a really clear picture, and he would like Mr. John and Mr. Evans to feel that their work was really appreciated.

Electrolytic Supersaturation

The remark by Dr. Berry about the electrolytic supersaturation of hydrogen at room temperature had aroused his curiosity; he did not know anything of that side, but it seemed a possible useful field from which founders could gain further useful information. Malleable founders were particularly interested in the "nucleation" of graphite which seemed to be effected by the rate of heating between 400 and 600 deg. C.; many expected that hydrogen played a very important part in that mechanism, but so far no proof was forthcoming. He felt it would be some time before University College, Cardiff, would be able to tackle that field; but the supersaturation of hydrogen electrolytically might offer a new line of attack, therefore he asked for Dr. Berry's reaction to the idea, in order to clarify the matter.

DR. BERRY replied that electrolytic charging had been a very cheap way of forcing hydrogen into steel for some years now. The general idea was that hydrogen was available in large quantities at the cathode in a sulphuric-acid cell, with current densities up to 2 or 3 amp. per sq. cm. The method had been utilized in the study of hydrogen embrittlement of steels for some time and there existed authorities in that field, mainly French and American, consequently quite a few references were available and a list of these could be supplied to anyone interested.

MR. J. DAWSON (BCIRA) recalled Dr. Riley's remarks on the evolution of CO, and said he assumed the reference was to grey iron.

Upon DR. RILEY confirming that that was so, MR. DAWSON said that Mr. E. R. Evans of the Association had also found that CO was evolved from grey iron, when heated in purified dry argon. This was measured with an infra-red gas analyser.

Effect of Silicon

MR. A. CIBULA asked if the Authors could explain the effect of silicon on hydrogen solubility, on structural or chemical grounds.

MR. JOHN said they believed that one reason for it was the fact that silicon increased the range of alpha stability in ferrous materials, alpha iron having a lower solvent power hydrogen than gamma iron.

MR. CIBULA then asked whether any effect of silicon on hydrogen solubility could be detected in a series of completely alpha irons.

MR. JOHN replied that he was afraid their work on that aspect was rather inconclusive. There would appear to be a slight decrease, but it was within the limits of experimental error and they would not like to comment on it.

THE CHAIRMAN (Mr. A. E. Peace) recalled the remarks of Mr. John concerning some work that was done in the USA, and asked if he could provide the reference to it.

MR. JOHN said it was the work of Thompson*.

Co-operation with Universities

THE CHAIRMAN, on the general matter of the co-operation of the universities with industry, said that in this particular case the work of University College, Cardiff, was of interest to industrialists. It exemplified the very valuable joint work of the University College, the BCIRA and the IBF. However, the remarks of Mr. Evans had indicated one of the "brakes on the wheel," which was the difficulty of obtaining suitable research students; that difficulty was experienced also at Birmingham University. He emphasized that money was needed from the industry to train research students at the universities, for more work at the universities was needed on subjects which were of importance to the founding industry.

Malleablizing Reactions

One aspect of the hydrogen problem was touched upon lightly by Mr. Hall when he had referred to the nucleation of graphite in malleablizing, much work was done in the United States a few years ago which had shown that, provided the metal was fairly well saturated with hydrogen, one could get a great increase in the number of nuclei for graphite formation by the slow heating-treatment mentioned by Mr. Hall, which was probably in the temperature range of from 250 to perhaps 500 deg. C. He had always felt that there must be some connection between that and the temper brittleness of steel, which, he believed, was experienced within the same range of temperature. Many years ago, a trouble which was experienced in blackheart malleable iron—within that same range of temperature—was embrittlement, although the structure was such that one would expect it to be completely ductile. It had been shown quite clearly that that could be controlled in two ways; one was by the reduction of silicon and/or phosphorus. However, if there were high contents of silicon and phosphorus, although the embrittlement did occur by reason of some particular slow rate of cooling through the range 500 to 250 deg. C., if the material was previously treated by heating to 700 deg. C. and quenching, then that slow cooling had no effect, *i.e.*, it did not produce embrittlement. It had been in his mind for years that gas content was connected in some way with that trouble. If anyone could add to what he had said on that matter, even if only in a speculative way, it would be of interest to the meeting.

* Thompson, T.A.I.M.M.E., 1945, 162, 369-374.

Analogy with Welding

DR. BERRY said he was reminded again of welding, because often the fissures and other failures in welds were of a similar character and they were associated with cooling rates between 200 and 400 deg. C. He suggested that the heating at 700 deg. C. probably outgassed the metal to a certain extent so that on quenching there was no embrittlement because there was little hydrogen present to embrittle the material. In other words, it did seem to be rather a hydrogen embrittlement mechanism.

Other Theories

MR. H. G. HALL said that another research worker of his acquaintance, for estimating hydrogen, had used the vacuum-heating method and had measured the pressure in the system during evacuation. His curves had shown that there was a tremendous increase in pressure during the first hour or so of heating, and then it tailed off; it was a terrific surge of pressure. Mr. Hall admitted that he was rather confused in his own mind about the matter, but Mr. John and Mr. Evans had shown the true equilibrium value of hydrogen. Dr. Berry had mentioned supersaturation, and one thought sometimes that supersaturation occurred; and that the friend he had mentioned, in his early experiments, was measuring supersaturated contamination, in a sense. It sounded very involved, he concluded; but members were groping for correlation between results such as had been obtained by the Authors and their own practical experience.

MR. EVANS said the general problem, in his view, was that the quantity of hydrogen in the lattice was fixed by the temperature, and anything above that quantity had to get away by some means or another. Whether it got out altogether or entered into voids or went somewhere else was a matter of opinion. He firmly held the view that it was not the hydrogen found in the test-pieces that caused trouble, but the hydrogen which had found its way outside or into voids and cracks. One of the matters which should have been tackled long ago was the determination of hydrogen in metal before it was cast.

MR. JOHN said he had no doubt whatever that most of the irons cast in foundries were supersaturated with hydrogen, for the melt very often contained a very large quantity of hydrogen. Sieverts, in his early work on pure iron, had reported an increase in equilibrium hydrogen solubility at the melting point of roughly 100 per cent., from 13 ml. per 100 gm. of metal to 25 ml. per 100 gm. He felt sure that a similar state of affairs existed in the commercial range of cast irons.

Further Work Envisaged

It was part of the plan at Cardiff University to extend the research work on this subject into the melting range of iron. In fact, some preliminary work was done on the subject and an apparatus to be used in the project was partially assembled. He felt firmly convinced that there were large quantities of hydrogen, well above the equilibrium level, at 1,000 deg. C. present in the molten metal, that a large part of this could be trapped in the casting during solidification. Consequently, this supersaturated hydrogen, probably in the atomic form, could diffuse through the metal to voids within the metal at junctions between the crystal grains and building up—the atomic hydrogen reacting to form molecular hydrogen at quite high pressure—led to failures which foundrymen knew only too well.

THE CHAIRMAN expressed thanks to Mr. John and Mr. Evans for their work, for having presented the Paper and for having replied to the discussion. He felt sure also that he was voicing the general opinion in saying that ways and means must be found for continuing this work which the University College was so well fitted to do.

Emergency Committee on Oil Supplies

An Oil Industry Emergency Committee has been set up at the Government's request. It will assist the Minister of Fuel and Power to deal with problems arising from the restriction of oil consumption.

The chairman is Mr. C. M. Vignoles, managing director of Shell-Mex & B.P., Limited. Other members are:—Sir Leonard Sinclair, chairman of the Esso Petroleum Company, Limited, Mr. C. M. Merrick, of Fina Petroleum Products, Limited; Mr. H. W. Rocke, of Mobil Oil, Limited; Mr. H. H. Bates, of National Benzole & Allied Products Association (N.B.A.); Mr. R. W. Ball, of the Regent Oil Company, Limited, and Mr. G. C. Hick, representing other companies.

At a Press conference last week, the Minister forecast an abrupt fall in oil imports shortly. Relaxation of restrictions would be possible when the navigation of the Suez Canal had been restored. Stocks in hand and reduced consumption would enable companies to continue with reduced supplies.

Companies in the steel industry largely support this statement, it is understood. A detailed study of alternative fuels and other considerations will be necessary, however, before a definite assessment can be made.

Non-destructive Testing of Materials

Nine specialists from six countries are taking part in a course arranged by the British Council on the non-destructive testing of materials. The course is designed to provide a broad survey of work in the United Kingdom on the development of non-destructive techniques, and the uses to which they are being put by British industry. It includes a series of lectures and discussions on methods employed for non-destructive testing of materials and components, instrumentation in the field of non-destructive testing, industrial use of techniques, and research work to improve existing techniques and develop new ones. Technologists from many industries, including the ferrous and non-ferrous metals, aircraft, electrical, shipbuilding, and chemical industries, etc.

The programme includes visits to the works of Solus-Schall, Limited, manufacturers of X-ray apparatus, of London, W.1; the National Physical Laboratory at Teddington (Middx); the Kodak works and the Kodak school of industrial and engineering radiography at Wealdstone (Middx); Aluminium Laboratories, Limited, Banbury (Oxon); Kelvin & Hughes, Limited, Barkingside (Essex); the Aeronautical Inspection Directorate, Harefield (Middx), and the Royal Aircraft Establishment, Farnborough (Hants).

British Blast Furnaces in the September Quarter, 1956

(These tables are published through the courtesy of the British Iron and Steel Federation.)

Derbyshire, Leicestershire, Notts, Northants, and Essex.

Name of firm.	In blast at end of the third quarter, 1956.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Clay Cross Co. (Iron & Foundries)	—	—	1	—	1	1	2
Ford Motor	—	—	1	—	1	1	1
Holwell Iron	—	2	1	—	3	2·9	4
Kettering Iron & Coal	—	1	1	—	2	2	2
New Cransley Iron & Steel	—	1	—	—	1	1	2
Renishaw Iron	—	—	2	—	2	2	2
Sheepbridge	—	2	—	—	2	2	2
Stanton Ironworks: Stanton-by-Dale	—	—	5	—	5	5	5
Staveley Iron & Chemical	—	—	4	—	4	3·9	4
Stewarts and Lloyds: Corby	—	4	—	—	4	3·8	4
Wellingboro' Iron	—	2	—	—	2	2	3
TOTAL	—	12	15	—	27	26·6	31

Lancashire (excl. N.-W. Coast), Denbighshire, Flintshire, and Cheshire.

Brymbo Steel	—	1	—	—	1	1	1
Darwen & Mostyn	—	—	—	1	1	1	2
Lancashire Steel Corp'n.	—	2	—	1	3	3	3
Summers, J.	—	2	—	—	2	1·9	2
TOTAL	—	5	—	2	7	6·9	8

North-West Coast.

Barrow Ironworks	3	—	—	—	3	3	4
Charcoal Iron	—	—	1	—	1	1	1
Millom & Askam	2	—	—	—	2	2	2
United Steel: Workington	2	—	—	1	3	3	3
TOTAL	7	—	1	1	9	9	10

Lincolnshire.

Appleby-Frodingham	—	3	—	—	3	3·3	4
Lysaght's Scunthorpe Works	—	3	—	—	3	3	4
Thomas, R., & Baldwins: Redbourn	—	2	—	—	2	2·9	3
TOTAL	—	8	—	—	8	9.2	11

North-East Coast.

Consett Iron	—	3	—	—	3	2·8	3
Dorman Long (Steel): Acklam	—	2	—	—	2	2	4
Redcar	—	2	—	—	2	2	2
Cleveland	—	2	—	—	2	2	4
Bessemer	—	2	—	—	2	2·5	3
Gjers, Mills & Co.	2	—	—	—	2	2	5
Normanby Ironworks	2	—	—	—	2	2	3
Skinningrove Iron	—	1	—	—	1	0·9	3
South Durham Steel & Iron:							
West Hartlepool	—	2	—	—	2	2	2
Cargo Fleet	—	2	—	—	2	2	2
TOTAL	4	16	—	—	20	20·2	31

Scotland.

Bairds & Scottish Steel: Gartsherrie	1	1	1	—	3	3	5
Carron	—	—	1	—	1	1	4
Colvilles: Clyde Works	—	3	—	—	3	3	3
Dixon's	—	2	—	—	2	2	6
TOTAL	1	6	2	—	9	9	18

South Wales and Monmouthshire.

Briton Ferry Works	1	—	—	—	1	0·6	1
Guest Keen Iron & Steel: Cardiff	1	2	—	—	3	3	4
Thomas, R., & Baldwins: Ebbw Vale	—	3	—	—	3	3	3
Steel Company of Wales: Margam	—	3	—	—	3	3	4
TOTAL	1	8	—	—	10	9.6	12

Labour Turnover Costs

The turnover of labour in manufacturing industry is costing the country £230,000,000 a year. That is one of those facts which, in a volume of statistics, might be noticed and no more. We have got so used to thinking in terms of millions of pounds that the fact that the present rate at which people are changing their jobs costs £700,000,000 means little or nothing to the layman.

Mr. R. L. Webster, chief personnel officer of Hoover, Limited, speaking to the British Institute of Management, dealt with the problem in more day-to-day terms. Out of every 100 men employed in manufacturing industry, 35 change their jobs every year, and the cost of replacing them can range from £5 to no less than £396 a head. A firm of engineers, he said, had spent £185 a head advertising for designers and draughtsmen, and a firm of chemical engineers had paid as much as £100 per engagement of technical staff.

Even so, advertising does not account for the whole £230,000,000. Where does the rest go? Principally in training new staff and overtime. One firm making aluminium foil found that scrap costs for each learner were as high as £151 for three months. Another firm with 400 workers was spending nearly £20,000 a year in overtime, 90 per cent. of which was necessary only because of labour turnover. Even if half the turnover were unavoidable, the cost to the nation in economic and social terms was staggering, said Mr. Webster, and management was doing little to reduce it.

"Free Trade" Views

Disregarding a liberal sprinkling of "if's" and "but's," there seems to be a fairly wide measure of support for the proposed European free trade zone on the part of the management and men who, whatever the Government does or says, have to make the scheme work. Mr. Peter Thorneycroft, President of the Board of Trade, now knows what a large number of trade associations and individual member companies of the Federation of British Industries thinks of the idea.

The only people who do not add provisos appear to be those in direct opposition—associations such as the Locomotive and Allied Manufacturers' Association. Their opposites—those giving unreserved approval—are non-existent. Most of the safeguards sought and most of the fears expressed have already been competently summed up by Sir Robert Maclean.

There must be tight rules against dumping, unfair trade practices, and other discriminations. Some look for taxation adjustments and harmonization of labour costs, and most insist that Commonwealth and Empire interests should not be jeopardized.

The British Iron and Steel Federation is among the group in favour provided safeguards are worked out. With them are the Export Group for the Constructional Industries, the Cement Makers' Federation, and the British Electrical and Allied Manufacturers' Association. The Shipbuilding Conference and the Society of Motor Manufacturers do not oppose further negotiations, "assuming that safeguards are worked out." The British Non-Ferrous Metals Federation is among the nine associations who oppose negotiations unless certain safeguards are assured.

Lightalloys Acquisition Effective

The offer to acquire the ordinary shares of Lightalloys, Limited, in exchange for ordinary shares of the Manganese Bronze & Brass Company, Limited, has been accepted by the holders of over 95 per cent. of the shares. The exchange of 6½ per cent. convertible debenture stock of Lightalloys in exchange for ordinary shares of Manganese Bronze & Brass has been supported in respect of over 97 per cent. of the debenture stock, and proved by extra-ordinary resolution of the stockholders. One Manganese 5s. ordinary is offered for every two Lightalloys 5s. ordinary, and five Manganese ordinary for every £3 of Lightalloys debentures.

British Blast Furnaces in the September Quarter, 1956—*continued*

Staffordshire, Shropshire, Worcestershire, and Warwickshire.

Name of firm.	In blast at end of the third quarter, 1956.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Goldendale Iron	—	—	1	—	1	1	2
Lilleshall	—	—	1	—	1	1	2
Round Oak Steel Works	—	—	—	—	—	—	2
Shelton Iron & Steel	—	3	—	—	3	3	3
Stewarts and Lloyds: Bilston	—	2	—	—	2	2	3
TOTAL	—	5	2	—	7	7	12
Sheffield.							
Park Gate Iron & Steel	—	2	—	—	2	2	2
GRAND TOTAL	14	62	20	3	99	99.5	135

Weekly Average Number of Furnaces in Blast during the September Quarter, 1956, and the Previous Four Quarters

District.	1955.		1956.		
	Sept.	Dec.	March.	June.	Sept.
Derby, Leics., Notts., Northants, and Essex	24.9	25.5	25.7	24·9	26·6
Lancs. (excl. N.-W. Coast), Denbigh, Flint, and Ches.	6.4	6.7	7	7	6·9
Lincolnshire	10	10	10.1	9.5	9·2
North-East Coast	22	20.8	21	21	20·2
Scotland	9	9	9	9	9
Staffs., Shrops., Worcs., and Warwicks.	7	7.2	7	7	7
S. Wales and Monmouth	9.6	9.8	10.8	9.8	9.6
Sheffield	1.3	2	2	2	2
North-West Coast	7.8	9	9	9	9
TOTAL	98	100	101.6	99.2	99·5

The following companies have furnaces in course of construction or rebuilding:—Dorman Long (Steel) (2); Lancashire Steel Corporation; South Durham Steel & Iron (West Hartlepool and Cargo Fleet); Millom & Askam Hematite Iron; Colvilles.

New DSIR Council

By Order-in-Council, the Queen approved that the Department of Scientific and Industrial Research Act, 1956, should come into force on November 7.

The chairman of the new council is Sir Harry Jephcott (chairman, Glaxo Laboratories, Limited), and the other members are:—Sir Eric Ashby (president and Vice-Chancellor, Queen's University, Belfast); Prof. C. E. H. Bawn, FRS (Grant-Brunner professor of Inorganic and Physical Chemistry, Liverpool University); Sir Hugh Beaver (managing director, Arthur Guinness, Son & Company, Limited); Prof. P. M. S. Blackett, FRS (Professor of Physics, Imperial College of Science and Technology, London University); Mr. Harry Douglass (general secretary, Iron and Steel Trades Confederation); Sir Walter Drummond (director of George Angus & Company, Limited); Mr. W. L. Heywood (general secretary, National Union of Dyers, Bleachers and Textile Workers); Dr. Willis Jackson, FRS (director of research and education, Metropolitan-Vickers Electrical Company, Limited); Sir Philip Johnson (deputy chairman, R. & W. Hawthorn, Leslie & Company, Limited); Prof. E. A. G. Robinson (Professor of Economics, Cambridge University).

Dr. H. W. Melville, FRS, the secretary of the present advisory council, will be the secretary of the new council.

Company News

DELTA METAL COMPANY, LIMITED—The company's offers for the ordinary shares of Mansill, Booth & Company, Limited, Smethwick, and Elkington & Company, Limited, Walsall, have been accepted by over 90 per cent. of the holders in each case. Accordingly, the offers have been declared unconditional.

MCKECHNIE BROS., LIMITED, manufacturers of non-ferrous metals, etc., of Birmingham—Group profits, before tax, amount to £1,052,162 against £1,632,482 for 1954-55. A sum of £250,000 is brought back from stock reserve—the previous year's allocation to that reserve was £135,000. A final dividend of 10 per cent., making 15 per cent., less tax, for the year to July 31, 1956, is recommended.

CANNON (HOLDINGS), LIMITED, ironfounders, etc., of Bilston (Staffs)—The directors recommend a dividend of 10 per cent.—payable out of reserves—for the year to June 30 last, against 30 per cent. for the previous year. Group net loss for 1955-56 amounted to £30,046 (profit, £145,877), after charging tax of £31,893 (£177,200). The decision of the directors to recommend an ordinary dividend is influenced by an encouraging recovery in sales during recent months.

SHEEPBRIDGE ENGINEERING, LIMITED—Conversion of the company's £83,682 5 per cent. cumulative preference 5s. shares into ordinary 5s. shares is planned. Preference shareholders will receive one ordinary share and 10s. in cash for every 10 preference shares converted. The board also proposes to increase the capital from £2,000,000 to £5,000,000 and to capitalize reserves against an issue of one ordinary share for every two held. Treasury consent, where needed, has been received.

SANBRA, LIMITED, sanitary brassfoundry, manufacturers, etc., of Birmingham—Unless there is a marked improvement, states the chairman, Mr. J. Cooper, 1957 may prove to be a difficult year. Profits are lower now than at the beginning of the year, and while results during the earlier months were satisfactory, losses arising from stock valuation will undoubtedly affect the year's working. An interim of 3¼ per cent. (as before) was paid on November 1, and for 1955 there was a final of 10 per cent.

BRUSH GROUP, LIMITED—The board is postponing consideration of an ordinary dividend payment until results for the full year 1956 are available. For 1955 there was a 3 per cent. interim and 7 per cent. final. It is stated that the turnover of the group factories during the first half of this year has exceeded in amount that for the same period of 1955, but costs of production, including wages, salaries, and materials, have increased sharply, and profit margins have narrowed, particularly in export markets where increased competition is being faced.

BRIGHTSIDE ENGINEERING HOLDINGS, LIMITED—Announcing a group profit, before tax, of £816,417, against £686,966 for the previous year, the chairman, Mr. Ambrose Firth, states that this reflects much larger sales. Overhead expenses increased, but the completion of long-term contracts favourably influenced overall results. Reporting on the Brightside Foundry & Engineering Company, Limited, which since June has operated the foundry and engineering divisions, Mr. Firth says orders for rolling mill and auxiliary plant were very satisfactory.

ELIOTT BROS. (LONDON), LIMITED, electrical measuring instrument makers—At the extra-ordinary meeting on November 5 the resolution was passed increasing the capital to £2,000,000 by the creation of a further 2,000,000 5s. ordinary shares. Acceptances of the offer by the company to the shareholders of Associated Insulation Products, Limited, have been received down to the close of business on November 5 in respect of 86.04 per cent. of the total share capital. The offer has been declared unconditional, but acceptances will continue to be received until December 31.

ARMSTRONG WHITWORTH (METAL INDUSTRIES), LIMITED—It is announced that 1,150,000 5s. ordinary shares at 6s. per share are being placed privately in the company. Application was made to the London Stock Exchange for a quotation for all the 2,500,000 ordinary shares in issue, and dealings commenced on November 8. The £375,000 6 per cent. £1 preference shares are already quoted. Turnover for the first nine months of 1956 was 16 per cent. higher than for the corresponding period of 1955, but increased wages have had to be met. Group profits for 1956 (subject only to tax) are expected to be in excess of £275,000, in which event a 10 per cent. dividend would be recommended.

BROWN BAYLEY'S STEEL WORKS, LIMITED—The final dividend is being raised from 3s. 3d. to 3s. 9d., tax free, per 2s. 6d. share, making with the increased interim, a total of 6s. 3d. per share, or 250 per cent., tax free, on the £37,500 capital for the year to July 31 last, against 5s. 3d., or 210 per cent., tax free, for the previous year. After increased tax of £76,506 (£58,723), and including a lower figure of £1,260 (£26,084) for special credits, the group profit balance is £92,027, against £94,535. Cost of the total dividends is £93,750, against £78,750. The profit figures include dividends from the Hoffman Manufacturing group and the Brown Bayley Steels group—the latter from August 1, 1955.

Recent Wills

HAND, WILLIAM, a director of Parker, Winder & Achurch, Limited, pump manufacturers, etc., of Birmingham £57,812

RUSSELL, W. S., managing director of S. Russell & Sons, Limited, engineers and ironfounders, of Leicester £36,293

TOWNSEND, C. R., chairman and joint managing director of Autoset (Production), Limited, manufacturers of casters, trucks, etc., of Birmingham £9,205

FARMER, ALFRED, founder and past governing director of Farmer Bros. (Gresley), Limited, foundrymen, manufacturers of mine haulages, etc., of Castle Gresley, near Burton-on-Trent £6,158

RIDSDALE, N. D., managing director of Ridsdale & Company, Limited, analytical, research, and metallurgical chemists, of Middlesbrough, and chairman of the Glycoline Lubricant Company, Limited, Stillington £34,870

EASTWOOD, W. P., chairman of George Swift & Sons, Limited, machine-tool makers, of Halifax, and of Swift-Summerskill, Limited, machine-tool makers, of Sowerby Bridge, and a director of the Asquith Machine Tool Corporation, Limited £88,569

Changes of Name

Among the companies which have changed their names are those listed below. The new titles are given in parentheses.

CARBONARTS, LIMITED, general and mechanical engineers, etc., of The Elms, Bushby, Leics (Carbon-Arts, Limited).

CORONA ENGINEERING COMPANY, LIMITED, Riverside Road, Summerstown, London, S.W.17 (Masson Scott (Hayes), Limited).

CONE AUTOMATIC MACHINE COMPANY (GREAT BRITAIN), LIMITED, 16, High Street, Solihull, Warwickshire (Cone Automatic Machine Company, Limited).

LANDS (COLONIAL WORKS), LIMITED, manufacturers of temperature measurement instruments, etc., of Queens Road, Sheffield, 2 (Land Pyrometers, Limited).

BCIRA Annual General Meeting

Coping with Expanding Services to Members

The thirty-sixth annual general meeting of the British Cast Iron Research Association was held at the Connaught Rooms, in London, on November 6, the president, Mr. S. H. Russell, C.G.I.A., being in the chair.

Long-term Matters

The minutes of the previous annual general meeting having been accepted as read and signed, the CHAIRMAN, presenting the annual report* and accounts, drew attention to certain important features which would arise in the future, as follow:

The president held office for two years only, which was a very commendable rule, but it had disadvantages in that unless the Council of the Association was fully aware of the policy and the administrative problems involved, continuity of policy might be lost, and the implications of developments involving considerable financial expenditure be overlooked. Two years ago, the Association had been faced with the quinquennial terms offered by the Department of Scientific and Industrial Research, which involved the ironfoundry industry in raising a very substantial sum before a grant could be obtained, and, indeed, it was not until nine or ten months had elapsed that the financial position had been resolved—through the good offices of the Joint Iron Council. That inevitably caused some delay in putting in hand the development plans which had been outlined to the DSIR twelve months earlier. Many of those developments were now well in hand, but were, as a result of this late start, taking longer to mature than had been hoped.

Turning to the report, members would realize that the Association relied very much upon its committees, sub-committees and panels, to which some 200 people, all actively concerned with the industry, very kindly gave their services. Those committees covered every aspect of the work of the Association, and details of the various activities would be found in the latter pages of the Report.

Income and Expenditure

With regard to the Income and Expenditure Account, income at £197,372 was a record figure, and the grant-earning income had been more than adequate to enable the Association to obtain the maximum Government grant of £56,000. Revenue expenditure had increased by about £27,000 as compared with the previous year—that reflected additions to the staff of the Association, and also increases in the cost of materials and all services.

It would be noticed that the excess of Income over Expenditure for the year under discussion was nearly £60,000, and at first glance the position was very reassuring. However, in the report would be found references to further commitments, which included a new research block and a building in which to carry out investigations on foundry atmospheres and dust control, involving a capital expenditure of at least £50,000. A careful estimate had been made in May last year of the further capital requirements up to June 30, 1959, from which it appeared that an additional £88,000 would be needed.

The largest items were the equipping of the experimental melting station, at a total of approximately £56,000, and equipment for further work on foundry atmospheres, estimated to cost £9,000. The remaining £23,000 covered the estimated expenditure of all the other activities of the Association. Experience had shown that as the Association expanded, due to the spiral of inflation (if it continued), costs increased substantially every year, and on that basis it was obvious that the whole of the revenue in two or three years time would be necessary to meet current expenditure. It therefore appeared that if all the schemes at present in hand were carried out, further finance would have to be found, and that was a problem to which the Council would have to give consideration in the immediate future.

It was disappointing that many foundries failed to take advantage of the services of the Association, which was now well equipped to give sound advice on both technical and practical problems, including means to secure increased efficiency, and steps were now being taken to try and remedy this position.

He moved that the report and the audited accounts be adopted.

The adoption of the report was seconded by MR. J. J. SHEEHAN, and carried unanimously.

Election of Officers

President

Proposing that Mr. J. J. Sheehan, B.SC., A.R.C.SC.I., be elected as president of the Association in succession to Mr. S. H. Russell, C.G.I.A., retiring under Article 24, THE CHAIRMAN pointed out that Mr. Sheehan, known everywhere as "John," commenced as an assayer and metallurgist in the United States and Mexico and subsequently at the laboratories of the Ford Motor Company at Detroit, Cork and Dagenham. Later, he was superintendent of the foundries of the Austin Motor Company, Limited, and was now managing director of the Coneygre Foundry, Limited. He had a great reputation as a founder and his ingenious and fertile mind had made notable contributions both to the art and to the science of founding. Arising from his recognition of the necessity for scientific control of sand, he pioneered work on moulding and core sands and had published the results, to the great advantage of the industry. His connection with the BCIRA dated from 1923, and he had been a member of the Council since 1940. He had been chairman of the Development Committee for 12 years; chairman of Council for six years, and had

*Abstract printed in the JOURNAL, November 1, 1956.

BCIRA Annual General Meeting

had some experience as chairman of the Research Committee.

Sir Frederick Scopes seconded the resolution and said he considered it a privilege to have that opportunity. Their Chairman had put in his comprehensive and expressive way all the considerations which they had in their minds and he was sure they were fortunate in having the opportunity of electing Mr. Sheehan as their president. He had much pleasure in seconding the resolution. When put to the meeting, the resolution was carried with applause and Mr. Russell, vacating the Chair, installed Mr. Sheehan as president.

Acknowledging his election, MR. SHEEHAN said he felt it a great honour and a great responsibility. The flattering remarks of Mr. Russell bore mainly on the fact that he was a foundryman, but that might not necessarily mean that he would be a good president. The more successful the Association became, the more services would be demanded from it and the more money required, and from the council meeting that day it was learned that more transport would be required. The Association was becoming better known and was, he felt, in a better position to-day to meet the demands of industry than ever before, but its resources were likely to be strained to the utmost—this would have to be borne in mind. As Mr. Russell had said, it would be for the council to try and arrange methods of meeting those calls on the foundry industry. They must get together on design, and it was more necessary now than ever before because they had a wider range of cast irons, and there was not yet a great deal known of the design requirements of those irons. He felt the users had not taken full advantage of the facilities the Association offered, although that might be mainly a matter of educating the designers. The Association had already gone some way towards that by making available the guide on design prepared by their opposite number in France, and he would personally recommend designers to consult the *Cast Metals Handbook* produced by the American Foundrymen's Association. He left it as a thought for them that there should be a meeting of the designers and the users with the industry.

The industry was faced with the necessity for meeting the Iron and Steel Foundries Regulations and in addition to meeting the requirements of the Clean Air Act, 1956. As the answers to the technical problems involved would be common to many foundries all over the country, and in order to ensure equality of treatment, the CFA were taking steps to see whether the industry could be treated as a scheduled industry, so that what was required under the Act should be carried out through the Alkali Inspectorate. All these things were the responsibility of the council and as their president, he would do everything in his power to maintain his interest, not in the industry alone, but in the Association and the associated bodies.

Finally, Mr. Sheehan assured the meeting that he would do his best and thanked them sincerely for the manner in which they had received his nomination.

Thanks to Retiring President

Proposing a vote of thanks to the retiring president for his past services, MR. A. E. PEARCE said the warmest thanks of the Association should be given to Mr. S. H. Russell, C.G.I.A., for his past services. They had never had a more conscientious, hard-working president and he was full of admiration for what he had done and the care with which he went into everything on behalf of the Association. Mr. N. P. Newman, seconding, said all of them knew the services which Mr. Russell had given to the Association and to the industry. In view of his many services to the industry, it was to be hoped that he might long be spared—they wished him luck and good health. When put to the meeting the resolution was carried by hearty applause.

Acknowledging the good wishes and thanks, MR. RUSSELL said he thought he had been lucky to have had the time to devote to that interesting work—interesting to him and to all of them. He thanked them sincerely for the vote of thanks; he had very much enjoyed the office and had found it interesting and would still do all he could to further the interests of the Association.

Vice-presidents

The proposition that Sir Vincent de Ferranti, M.C., Mr. Francis D. Ley, J.P., T.D., Major R. Miles, B.SC., M.I.MECH.E., Sir Percy Mills, Bt., K.B.E., and Mr. W. T. Wren be elected members of Council and vice-presidents of the Association in accordance with Article 24 and that Mr. H. J. V. Williams, president of the Institute of British Foundrymen, be elected a vice-president in accordance with Article 24 was proposed from the Chair and seconded by Mr. R. L. Handley and carried unanimously.

A vote of thanks to the retiring vice-presidents was proposed by SIR LINCOLN EVANS and seconded by MR. C. GRESTY and carried with acclamation.

Council

It was agreed that the re-election of members of Council retiring under Article 29 should be dealt with by one resolution and MR. V. C. FAULKNER, proposing the motion, said it gave him great pleasure to propose that Mr. C. C. Booth, J.P., M.I.MECH.E., Mr. W. J. Colton, F.I.M., A.M.I.MECH.E., Mr. E. C. Dickinson, M.MET., F.I.M., A.M.I.MECH.E., Mr. V. Everard, J.P., M.I.MECH.E., Mr. C. Gresty, Mr. R. L. Handley, B.SC.(TECH.), A.M.I.E.E., Dr. J. E. Hurst, C.B.E., J.P., Lt.-Col. H. H. Jackson, O.B.E., J.P., Mr. A. E. Pearce, Mr. S. H. Russell, C.G.I.A., and Mr. G. R. Shotton be re-elected and that Mr. M. M. Hallett, M.SC., F.I.M., and Mr. A. Wynn (appointed during the year ended June 30, 1956, in accordance with Article 31) be re-elected. The proposition was seconded by MR. R. S. DARBY. Put to the meeting, the motion was carried unanimously.

Honorary Member

MR. R. L. HANDLEY, proposing that Mr. S. H. Russell should be elected an honorary member of the Association, said for a number of years those of them who had been members of Council of the Association, had watched Mr. Russell's interest in the Association's activities. He thought they should not allow him to retire without some recognition. For his past services, he proposed that Mr. Russell should be made an honorary member of the Association. SIR FREDERICK SCOPES, seconding the resolution, said this was a way in which the Association could recognize and put on record their sense of indebtedness to Mr. Russell. He had the greatest pleasure in seconding the proposal made by Mr. Handley. The resolution was carried with acclamation and Mr. Russell, acknowledging his election, said he would treasure their resolution as a recognition of any services he might have been able to render the Association.

Auditors

THE SECRETARY announced that in accordance with the Companies Act of 1948 the auditors, H. Overton & Company, chartered accountants, had been re-appointed auditors to the Association.

Appreciation

Council and Committees

On the motion of MR. G. W. NICHOLLS, seconded by MR. J. BAIN, the warmest thanks of the meeting were accorded the Council, committees and sub-committees for their work during the year.

Chairman

The vote of thanks to the Chairman for presiding at the meeting was proposed by MR. K. MARSHALL and seconded by MR. PEARCE.

Director and Staff

The Chairman, thanking the members for their vote of thanks, said he thought it a privilege to propose that their thanks should be given the director and his staff. He found no difficulty in proposing that vote of thanks to the director because he had been for a long time associated with the Association. He was very much in earnest when he said their best thanks should be given to the director and his staff. The proposition was carried with acclamation. This concluded the meeting.

Three-year Plan for Steel Company of Canada

Current rated steelmaking capacity of 2,150,000 tons annually makes the Steel Company of Canada the ninth largest on the North America continent. Now it is announced that the total outlay on the company's three-year expansion programme will be $108,000,000.

The programme began early this year and about a quarter of the total will be spent by the end of the year, two thirds next year, and the remainder in the third year. Construction is well under way on the new blooming mill which will give additional blooming capacity for any future increase in steelmaking.

Law Cases

Iron Dresser Claims £3,000 Damages

Damages of £3,000 are being claimed by a young Paisley iron dresser, David Hutchison, who lost his right eye after an accident while employed by Babcock & Wilcox, Limited, Renfrew. The case came before Sheriff J. B. M. Young and a jury at Paisley on October 29. On December 16, 1954, while working in the dressing shop, Hutchison removed his protective goggles and walked from his own bench to assist another man with a casting. When he stood up to return to his bench he was struck on the eye by a sliver of metal.

A few days later at Paisley Royal Alexandra Infirmary his right eye had to be removed. Hutchison claims that the goggles he was given to protect his eyes permitted no side vision, were inadequately ventilated and misted up rapidly when in use. They had frequently to be removed for cleaning and it was not possible for employees to pick their way with safety about the floor of the dressing shop, which was littered with casting boxes and castings, without removing their goggles. He avers that the accident was due to the fault and negligence of his employers.

The employers deny that the goggles were inadequately ventilated and that it was impossible for employees to move about the shop with safety without removing them. They state that Hutchison was only 2 yds. away from the man he went to assist and that there was no need for him to remove his goggles. He had been warned on numerous occasions by the safety officer to keep his goggles on. They maintain that Hutchison was a frequent offender in removing his goggles. Hutchison, who earned about £11 a week as an iron dresser, returned to the firm's employment in May, 1955, as a general labourer at a wage of about £9 2s.

Jarrow Fitter Awarded £3,688

At Durham Assizes recently, Mr. Justice Barry awarded Thomas William Welsh, of Selkirk Street, Primrose, Jarrow, £3,688 10s. 1d. and costs. The claim arose out of an accident at the bar and strip mill at Jarrow of the Consett Iron Company, Limited, in consequence of which Welsh had to have his right leg amputated. Welsh, a maintenance fitter, was carrying out repairs to a straightening machine when it started up; his foot and leg were crushed.

Mr. Justice Barry said that the machine was properly guarded from the operator's position, but not for anyone working on the top of it. He did not believe that Welsh had any idea that the machine would be started up. Without thinking of the consequence of his action, a fitter's labourer, John William Hogg, started the machine " on the spur of the moment."

Steelworker's Damages

Agreed damages of £1,250 and costs were awarded by Mr. Justice Streatfeild at Chester Assizes to Mr. William Coombes, a labourer at the Hawarden Bridge Steelworks of John Summers & Sons, Limited.

Mr. Coombes received injuries to his back when he fell through a hole in the floor while walking alongside a furnace.

AT Grantham (Lincs) Borough Magistrates' Court, Aveling-Barford, Limited, road machinery manufacturers, etc., of Grantham, was fined £5 for failing to take effective safety precautions at the works, contrary to the Factory Acts. It was stated by the prosecution that on June 20, Mr. Charles Peckett (63) was killed while working on the track of an overhead-travelling crane.

Notes from the Branches

Birmingham

The second meeting of the session of the Birmingham branch of the Institute of British Foundrymen was held at the James Watt Memorial Institute, Birmingham, on Wednesday, October 24, when about 90 members heard Mr. T. R. Twigger give a very interesting Paper entitled "Experience in the Use of a Coreless Mains-frequency Melting Furnace." It is known that a number of these installations are working in Germany, but this Paper dealt with the experience gained from operating the first furnace of this type to be installed in this country. Mr. Twigger explained how the mains-frequency (50 cycles) coreless furnace differed from the mains-frequency core-type furnace which is widely used for non-ferrous metals, and emphasized the essential features of this coreless-type furnace with regard to electrical characteristics, and consequent limitations on size of the material constituting the charge. Among the interesting points brought out was the rate of input for differing charge weights, indicating that with suitable coil design, a high proportion of the maximum input could be well under half the total charge weight. Tests covering carburization and desulphurizing, the latter by direct addition of calcium carbide to the furnace, were described. Mr. Twigger concluded by outlining the factors which governed operating costs, making comparisons with high-frequency installations.

Mr. Shotton proposed the vote of thanks, saying that members appreciated the fact that Mr. Twigger had presented the results of this pioneering to his own branch of the Institute, and the proposition was suitably seconded by Mr. Pearson. The Paper provoked a lively discussion in which many members took part.

West Wales

Mr. J. A. F. Jarvis presented a Paper entitled "Ultrasonics in the Foundry" to a well-attended meeting of the West Wales section of the Wales and Monmouth branch on November 2, at which Mr. R. S. Turner presided. After a brief resumé on early experiments, he dealt more fully with uses of ultrasonics for the non-destructive testing of metal components and the developments that have been made for the inspection and close control of quality of high-duty iron castings. With the aid of slides, he showed the mechanics of the process and methods of inspection and, using equipment and a number of castings brought to the meeting, gave a practical demonstration of the method of locating faults. Another development was that in some circumstances test-bars could be examined and their tensile strength estimated to within one ton of the actual breaking stress.

In the discussion that followed, much interest was shown in the examination of test-bars, it being generally agreed that many foundrymen would be happy to know the strength of test-bars before sending them to customers! Questions were also asked about locating the exact position of defects and after explaining the procedure, Mr. Jarvis added that establishment of the position was much simpler and more accurate with cast steel than with cast iron. The vote of thanks was proposed by Mr. R. Jones and seconded by Mr. I. Thomas.

South Africa

Continuing its series of meetings, the South African branch held a "Brains Trust" on October 25 in Johannesburg, the "Trust" chairman being Mr. R. A. Miller, who was on a business trip from the United Kingdom. The subject was "Defects in Castings" and several slides were shown which had been used in the production of the Institute's *Atlas of Defects in Castings*. The team of experts, covering the fields of moulding sand, cast iron, steel, copper-base and aluminium alloys, supported Mr. Miller in answering questions. The interest of South African foundrymen in defective castings was evidenced by the attendance of 70 members and guests. Mr. Harry Holdsworth proposed the vote of thanks at the end of the meeting, which was heartily accorded.

Northampton

On Saturday, October 20, the Northampton & district section of the East Midlands branch visited the works of Foundry Equipment, Limited, at Leighton Buzzard. The visitors, who numbered exactly 30, were shown the foundry, tool-room, erecting shop and structural department where most of the company's extensive range of foundry machines were exhibited and demonstrated. The visit lasted from 10.15 a.m. to 12.30 p.m. and was actually the first time that a party from the Institute of British Foundrymen had visited this company, which celebrated its 21st anniversary earlier this year. Each visitor was presented with a souvenir of the occasion.

Australia (Victoria)

The September meeting of the Australia (Victoria) branch was devoted to a discussion between Mr. L. McK. Hamilton and Mr. G. P. Adams as to the relative advantages and disadvantages of core moulding and shell moulding. As usual, the meeting ended with a supper.

House Organs

Foseco Foundry Practice, No. 126; issued by Foundry Services, Limited, Long Acre, Nechells, Birmingham.

A useful article in this issue draws attention to the disastrous results which can arise from the use of scrap emanating from chemical works. In the case cited, it was found that a consignment of scrap steel tubes, on being melted, produced an unexpected degree of chill on wedge test samples, and, subsequently, some 6 tons of hard "white" iron had to be directed to the pig bed. Examination of the tubing revealed that it was full of a black powder containing 42 per cent. of iron and 33 per cent. of sulphur. In the same issue, there are also notes on a stained cast-brass door-handle and on the solubility of hydrogen in aluminium.

The Iron Worker, Vol. XX, No. 4; issued by the Lynchburg Foundry Company, Lynchburg, Va.

This issue contains a well-illustrated story of the invention by Cyrus McCormick of the first reaping machine, which was the very beginning of farm mechanization. Some of the examples of American architecture illustrated are particularly charming.

Staveley News, Vol. 5, No. 4; issued by the Staveley Iron & Chemical Company, Limited, and the Sheepbridge Company, Limited, near Chesterfield.

This issue reports how Kenneth Hughes, a 16-year-old foundry laboratory assistant, has, following an address to the British Association of the Advancement of Science, had a number of BBC and television appearances.

Casting Metals in Glass Moulds

By Thomas A. Dickinson

A method of precision casting metals in glass moulds has been developed by Corning Glass Works, Corning, New York, USA. Because the moulds can be used at extremely high temperatures, it is claimed the process permits the production of both ferrous and non-ferrous castings with fine detail, excellent surface finishes, and closely-regulated metallurgical structures. It also eliminates the need for the pre-coating stage in investment casting, and prevents cracking or spalling.

Basic Process

The basic mould material is a powder comprising 96 per cent. pure silica glass. This is mixed with water to produce a casting slip. When poured into a porous-plaster form and after excess has been decanted, the slip becomes a shell as the result of dehydration. Next, the shell is removed from the plaster and fired, and subsequently the shell becomes part of a mould and may be used without further treatment.

Castings produced by the process, it is stated, have blemish-free surfaces of better than 40 micro-inch finish and require little or no further treatment. The mould material has high chemical stability and does not react with the metal or its oxides to cause surface imperfections. Accurate control of grain size is thus possible at metal pouring temperatures up to 1,760 deg. C.

Close dimensional control is attained because the vitreous powder has extremely low thermal-expansion, which prevents the abrupt volumetric changes that characterize foundry sands. Consequently, tolerances of ±0.005 in. per inch have been obtained readily and definition has been held to 0.020 in. The thermal shock-resistance of the glass shells is such that it is said they can even be fired and then quenched in cold water without cracking! In commercial production tests, not more than 10 per cent. of the finished castings have been rejected because of imperfections. Low tool-up costs have made short runs practical, and the period between mould preparation to actual casting has been reduced. The new glass moulds are recommended as suitable for conventional static, pressure, centrifugal, and vacuum casting methods used in connection with aluminium, brass, carbon steels, stainless steels, cobalt- and chromium-base alloys.

Equipment Required

Standard equipment for mould fabrication includes a model, containers for slurry, scales, a mechanical mixer, a drying oven with a temperature-control range of 40 to 150 deg. C., and a firing furnace with temperature range up to 900 deg. C. Materials used are the silica-glass powder, dense plaster, porous plaster, a parting compound, and water.

The model of a desired casting, which may comprise any machinable material which can be given a high finish and will meet dimensional requirements, is embedded in a profile plate incorporating the desired gating, risers, and parting line. Then the parting compound is applied and a dense plaster slurry is poured into the moulding box set around the assembly. After setting, the dense plaster itself becomes a pattern negative which can be used in making porous-plaster moulds. A parting compound comprising Bayberry wax and petroleum is applied to the pattern and the porous-plaster mould is poured, allowed to set, then dried, taking care to avoid calcination and cracking. From one finished plaster mould, 15 to 20 glass shells can be made without surface defects or a substantial loss of dimensional accuracy.

The " slip " for the glass shell is prepared by mixing four parts of powder with one part of water by weight. A 10-lb. batch can be prepared with a high-speed mixer in an hour by feeding the powder into the water gradually; or any specified quantity of slurry can be mixed in stoppered bottles kept rotating on rollers; as long as it is agitated, the slip will remain usable.

A porous plaster mould will absorb enough water in 5 to 10 minutes to build up a shell of glass solids with the desired thickness. Then excess liquid slip is drained off for re-use and the glass shell is dried for 15 min. at 60 deg. C. After removal from the plaster form, the shell is oven-dried at 93 deg. C. and fired for half an hour at 770 to 1,040 deg. C. depending on the strength desired. Shells, thus produced, may be used at once or stored indefinitely.

For casting purposes, glass shells can be wired or taped together and backed by loose sand, metal shot, or any granular refractory material. Or they may be held in place with wire or refractory cement alone. A glass mould is ready for casting operations after it has been preheated to a specified temperature for ten minutes.

FORTY STOTT gas-operated Magna water boilers have been supplied to cope with teamaking demands at the River Don workshops of the English Steel Corporation, Limited, Sheffield. The management aims to ensure that all workshop employees have sufficient fresh boiling water close to their work.

ALBERT MANN'S ENGINEERING COMPANY, LIMITED, Basildon (Essex), has been acquired by the United Flexible Metallic Tubing Company, Limited, which proposes to allot 19,640 10s. ordinary shares to Mann's holders. United Tubing has an authorized ordinary capital of £800,000, of which £648,085 10s. is issued.

Productivity in Iron and Steel

Increase of 41 *Per Cent. in* 10 *Years*

Productivity in the British iron and steel industry increased by 41 per cent. between 1946 and 1955. This "proud record" is examined in a British Productivity Council review, published recently, which commends it as an achievement "hardly equalled by any other manufacturing industry."

Since the end of the war, capital investment in iron and steel has amounted to £470,000,000, and the total amount invested for every worker in a new integrated steelworks now stands at £10,000. Yet, as the review points out: "Even if each ton of steel now involves a heavier call on the nation's resources of capital (and it is by no means certain that it does) investment in new plant and equipment has so reduced the call on labour, fuel, and raw materials that the total *real* cost of steel is now less" (than 10 years ago).

Furthermore, as is shown in a table comparing steel prices, the principal products of the industry are cheaper in this country than in the United States, Germany, France, or Belgium. In fact, Australia, which is in the fortunate position of having its own high-grade and easily accessible iron ore, is the only sizeable steel-producing nation to quote trade prices in its own country that are below the British level. The British achievement is made even more noteworthy by the fact that its home-produced ore has a relatively low iron content; over 40 per cent. of the total iron ore used in this country has to be imported.

Plant Economy

Capital investment has not stood alone. Credit is duly given to economy in the use of plant, of fuel, and of raw materials, and also to effective management. Yet indispensable in all these is the active co-operation of every worker in the industry. "Emphasis on the rôle of capital investment must not be taken as suggesting that the steel industry is not closely concerned with the standard of its labour force. Such investment, while reducing the quantity of labour that goes into steel, makes its quality vital." The workers, through their unions, have clearly recognized their responsibilities and have for many years fully grasped the close connection between high productivity and high earnings —an appreciation which underlies the policies of the majority of American trade unions.

Looking to the future, the review stresses the importance of a highly efficient, low-cost steel industry to the British economy as a whole. Although the industry has a fine record in productivity and has instituted plans for further improvements in the next few years, there is no room for complacency. "All the leading industrial groups—the United States, the European Coal and Steel Community, Russia, and Japan—are planning heavy investment programmes in steel.... The success of the British steel industry's productivity campaign since the war must be a spur to further effort."

The BPC review, a 48-pp. illustrated booklet, is obtainable from the British Productivity Council, 21, Tothill Street, London, S.W.1 (2s. 6d.). It acknowledges the assistance received in the preparation of the review from the British Iron and Steel Federation, the Iron and Steel Trades Confederation, and other trade organizations, and from individual companies. "A feature which stands out in the post-war story of the industry," it says, "is the collective services provided by the British Iron and Steel Federation and its allied organizations, which set an example to other industries."

Indian Market for Lifting and Conveying Equipment

Freight carried by Indian railways in 1954/5 totalled 143,300,000 tons, which suggests that the market for lifting and conveying equipment is large. India still has a vast surplus of manpower; on the other hand, she is on the brink of a massive programme of economic development, envisaging the expenditure of £5,400,000,000 by 1961.

A report by the Export Services Branch of the Board of Trade (Lacon House, Theobalds Road, London, W.C.1; reference COM/12525) points out that at the present stage of India's industrial development, goods handling is far less mechanized than it is in Europe. A common unit of weight in India is still the maund of about 80 lb., the measure of one man's carrying capacity. In numerous situations in which, in the United Kingdom, mechanical equipment would be used, loads are manhandled in India. As industrial development proceeds, the quantity of goods requiring to be lifted and conveyed will rise, and within the total the proportion mechanically handled will also increase. This should open up good prospects for the sale of United Kingdom lifting and conveying appliances in India, the report states.

The demand for derrick cranes is not large; there is at present only one shipbuilding yard in India, at Vishakapatnam. Wharf cranes are extensively used, but indigenous production is growing and orders for ordinary types are likely to stay at home. There may be a demand for portal electric luffing cranes for the equipment of new ports, and also for mobile cranes, particularly the slow moving kind.

The use of fork-lift trucks has not yet made much progress in India. They would revolutionize traditional storage methods and, perhaps more than other lifting appliances, would be regarded as encroaching on the work of manual labour. The limited number of trucks which are in use come in for rough handling, particularly of the clutch mechanism, and require to be of robust construction.

Overhead-travelling cranes are in demand for engineering workshops, and given the likely expansion of the Indian engineering industry, the call for this type of crane, preferably electrically driven, is likely to increase. Hoists are in good demand, particularly those which are electrically driven.

Calcium Silicide. John Le Boutillier, Limited, British Columbia House, 3, Regent Street, London, S.W.1, have issued an interesting six-page folder which tells of a multitude of uses for CaSi in metallurgy but the only mention that is made of cast iron is that it can be used to advantage. The material described is of German origin. This pamphlet is obtainable on application to British Columbia House.

Equipment & Supplies

Wet-belt Grinding Machine

A new wet-belt grinding machine, (Fig. 1) specially designed to derive the highest efficiency from the latest electro-coated resin-bonded abrasive belts, has been produced by Taylor Tools & Supplies, Limited, Vortex Works, Broadheath, Altrincham. A hand-operated micrometer table is fitted which has anti-friction ways and is Tee-slotted so that it can be traversed clear of the belt for work setting. The micrometer stop permits repetition sizing. A feature of the design is that the abrasive belt pulleys, both driving and idler, are not "overhung" but are supported on both sides in large

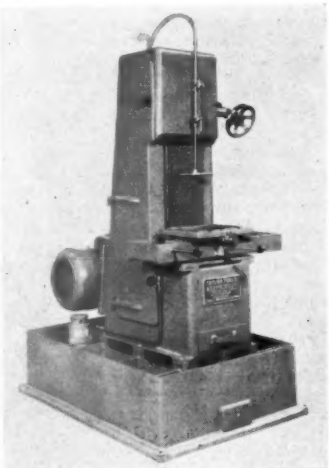


FIG. 1.—*Wet-belt grinding machine, made by Taylor Tools & Supplies, Limited, which can be used for the precision grinding of castings.*

ball and roller bearings and are housed and protected by labrynth seals. To enable the platen to be easily squared to the work table the platen carrier is fitted with a screw adjustment. The base of the machine forms a large capacity settling tank which has multiple compartments for clearing the coolant before it is recirculated by the pump and a readily-removable drawer collects the heavy swarf before it can reach the tank. One compartment of the tank houses a motor-driven centrifugal pump the three jets of which direct the coolant, first, above the work-piece; second, to the back of the abrasive belt for lubricating it in its passage over the platen, and, third. below the work table;—this latter cleaning the swarf from the surface of the belt so that the abrasive can operate efficiently when it again makes contact with the workpiece.

Spraying Plant

A new ultra-lightweight petrol-engined portable spray-painting plant, to meet a need for a self-contained unit for use where no electric power supply is readily available, has been introduced by Alfred Bullows & Sons, Limited, of Long Street, Walsall. The compressor unit and engine together weigh only 46 lb. A self-recoiling rope-type starter ensures easy starting and a low running-speed of 2,200 r.p.m. gives long life and quiet operation. The plant is sold complete with an L.800 spray-gun with quart container, 30 ft. of air hose, and connectors; larger pressure containers are available as extras if required.

Spray-gun Nozzle

The same firm announce a new spray-gun nozzle design, namely the tangential nozzle, claimed to be a major step forward in obtaining the maximum conversion of energy of the air passing through the fan parts to produce a fan spray. In a conventional nozzle, this energy would appear to be largely dissipated because the air paths are opposed, so that the two air streams strike into each other directly. By using a tangential arrangement of the nozzle jets, the kinetic energy of the discharged air is used, as the two air streams pass tangentially across the face of the nozzle. A very wide spray and maximum coverage per pass of the gun can thus be attained with the minimum consumption of air at minimum pressure. It is reported to be possible to reduce atomizing air pressure from 50 to 5 lb. per sq. in. with improved performance and corresponding savings in air and material.

Hand-lift Truck

Stillages with an underclearance of more than 21 in. can be handled by a new model of the Blue Streak hand-lift truck produced by the Yale & Towne Manufacturing Company, Wednesfield, Wolverhampton. The truck which has a capacity of 2,500 lb. is mechanical in operation. The platform is elevated by one downward stroke of the handle and locked in position by depressing a pedal, and a second pedal permits the load to be lowered against an hydraulic load check which protects operator, truck and load from damage. Different sizes of platform are available, and, if required, wheels (of cast iron or rubber-tyred) can be fitted with roller bearings instead of ball bearings. This company also announces the introduction of a new series of medium-range electric trucks for steelworks. Known as the K-48 series, they are built in capacities of from 8 to 13½ tons.

Portable Compressor

Among new items of equipment introduced at the Public Works Exhibition by the Ingersoll-Rand Company, Limited, is the TP.120 portable compressor, a two-stage air-cooled unit of three-cylinder construction with a free air delivery of 120 cu. ft./min. at 100 lb./sq. in. It is powered by a Ford 563E or Gardner 3LW engine. The TP.120 is available with four types of running gear, and can be supplied without running gear for mounting on a lorry.

Invisible Chrome Protector

A new product designed to give lasting invisible protection for all polished metal surfaces is being marketed by the pressurized dispenser division of Amber Oils, Limited, 11a, Albemarle Street, London, W.1. It is called Blink invisible chrome protector, and is a clear cellulose lacquer packed in a small dispenser.

MANCHESTER OIL REFINERY (SALES), LIMITED, Twining Road, Trafford Park, Manchester, have developed and placed on the market a new material for detecting minute surface defects in non-magnetizable materials known by the trade name of Britemor fluorescent flaw-detection ink.

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s.)

757,494. L. N. Hocking, Trucast, Limited, Farnham Royal Lodge, Farnham Royal, Bucks.

A method for making refractory investment moulds for the manufacture of precision castings from slurry or concentrated dispersion of fine and coarse particles of refractory materials. The coarse particles would be of aluminium silicate of 30 to 80 mesh, and the fine of zircon, 40 per cent. of which are finer than 240 mesh. The coarse particles are of lower specific gravity compared with the finer particles to avoid segregation during the jolting process.

757,568. Kaiser Aluminium and Chemical Corporation, 1924 Broadway, Oakland, California, USA.

The continuous casting of light metals by the direct chill method. More particularly, the invention relates to a method for casting continuously, high-strength aluminium-alloy ingots of relatively massive cross section.

757,602. Erwin Buhrer, 117 Alpenstrasse, Schaffhausen, Switzerland.

Mechanical preparation of moulds from granular material. A quantity of granular material is poured over a pattern contained in a moulding box, in greater quantity than that required for the finished mould. The mould box is surmounted by means which increase its height so that the surplus granular material can be poured over the whole surface of the pattern. The granular material is precompacted, the surplus removed, and then submitted to final compaction.

757,603. M. A. Bunford, 13 Boulevard Princesse Charlotte, Monte-Carlo, Monaco.

A centrifugal casting machine (also see Patent No. 734,064, FOUNDRY TRADE JOURNAL, August 18, 1955), to which any desired form of mould can be readily secured, and with which any desired form of feeding device can be employed.

757,690. G., B., J., M., and H., Giulioli, 40 Rue d'Alsace, Courbevoie (Seine), France.

A method of lining a steel structure with an alloy coating having a lower melting point (particularly copper/lead alloy), suitable for the manufacture of bearings.

757,789. Allis Chalmers Manufacturing Company, Milwaukee, Wisconsin, USA.

Production of as-cast spheroidal-graphite iron, which is cerium, lithium, copper, and nickel-free.

757,936. E. Vaders, 59½ Schulweg, Poking uber Starnberg, Obb, Germany.

Bearing-alloys containing more than 2.5 and up to 40 per cent. of lead, and 0.1 to 6 per cent. silicon, the remainder being copper.

757,942. Buders'sche Eisenwerke, 52-56 Sophienstrasse, Wetzlar, Germany.

A material for use in forming moulds specially for precision-casting processes, in which coating and backing materials having a silicic base are used. This material contains as binder a finely ground natural or synthetic slag (or metallurgical slag, such as cupola-furnace, blast-furnace or converter slag), which has a high silicic acid and lime content and which is dissolved in acid.

A Leeds Service Laboratory

From time to time, founders having specific problems either of a metallurgical or practical nature, feel the need for independent advice, perhaps involving laboratory testing or experiment of the sort not generally catered for by the specialized research associations. A visit to one establishment giving service of this type was recently described in the JOURNAL and what follows is an account of another concern, this time serving founders mainly situate in central and northern England.

The independent organization of Guthrie, Adams & Company, of 4, Leighton Lane, Leeds, 1, foundry consultants and metallurgical chemists (proprietor, D. Guthrie) was founded 11 years ago to serve the industry in technical and practical matters, and many medium and small foundries, unable for economic reasons to employ their own technical and laboratory staff, are availing themselves of the facilities offered. In the laboratories a qualified staff carry out analysis of ferrous and non-ferrous metals and assist founders to maintain routine control on their raw materials such as pig-iron, coke, etc., and on the metal mixtures employed. Advice is given and recommendations made concerning the optimum compositions and furnace charges to use for many types of castings, and those called upon to produce castings against set specifications can often be furnished with all necessary details and instructions for going ahead.

Mechanical testing equipment of modern type is available for carrying out physical tests, such as for transverse and tensile strength and Brinell hardness on cast irons, and any additional testing required for steel and non-ferrous metals.

Micro-examination and photomicrography are used extensively for the examination of structures and grain-size of metals during investigation of materials which have failed, perhaps in service or when tested to destruction. Non-destructive tests by X-ray and crack-detection methods are also available and prove of great assistance to founders who are commencing manufacture of intricate and complicated castings. Any unsoundness or porosity can be revealed on prototypes before a job goes into production.

Raw-material Checks

In addition, many engineers and inspecting authorities use the organization for checking and maintaining the quality of raw materials, and samples are often received so that arbitration tests can be carried out in case of disagreement between manufacturer and purchaser. Laboratory and staff are fully approved by the Ministry of Supply, A.I.D., I.F.V., and C.I.A. departments, and also by the Air Registration Board, for the analysis of ferrous and non-ferrous metals, and are continuously carrying out analysis on their behalf as well as for other Government inspection departments and foreign railways.

Consultation on other foundry problems, such as production methods, casting technique, moulding sands, mechanization and mechanical aids, is also an important branch of the organization. Modern developments in foundry practice are investigated and advice given depending entirely on an appraisal of the needs and conditions of each particular foundry.

* "Expanding Laboratory Service," JOURNAL, June 14, 1956, p. 455.

ELWELLS ENGINEERS, LIMITED—Mr. H. Speed, who has been general manager for five years, has been elected a director.

News in Brief

INGOT FOUNDRY COMPANY, LIMITED, Grove Street, Brighouse, Yorkshire, has had plans approved for the erection of workshops and office premises at Sherwood Road, Brighouse.

SIMPLEX ELECTRIC COMPANY, LIMITED, has opened a new London depot at Alperton (Middx). The cost of the new building has been estimated at between £35,000 and £40,000.

THE MACHINE TOOL TRADES ASSOCIATION announces a change in its address, with effect from November 12, to Brettenham House, Lancaster Place, London, W.C.2 (telephone: TEMple Bar 3606/8).

AVERAGE SELLING PRICES of members of the Federation of Light Metal Smelters for September (calculated to the nearest 10s.) have been calculated to be:—LM1, £174 per ton; LM2, £173; LM4, £194; LM6, £205.

JUTE HESSIAN treated to protect bright steel parts against corrosion and rusting is now in commercial production, following research work undertaken in the laboratories of the British Jute Trade Research Association.

GEO. SALTER & COMPANY, LIMITED, of West Bromwich, announce that they have received from the Massey-Harris-Ferguson Company, of Toronto, an order for a large quantity of roller bearings worth $30,000.

THE THIRTY-SECOND MEETING of the Iron and Steel Engineers Group will be held at 4, Grosvenor Gardens, London, S.W.1, on December 5, starting at 10.30 a.m. and, with an intermission for luncheon, will continue until 4 p.m.

Mr. FRANK A. HURST, chairman of Samuel Osborn & Company, Limited, steelmakers, Sheffield, entertained the Lord Mayor of Sheffield, Alderman R. Neill, and Mrs. Neill, the Lady Mayoress, to luncheon on November 8, when they visited the works.

THE WEST MIDLANDS BRANCH of the Institute of Export is to hold its 21st celebration dinner at the Queen's Hotel, Birmingham, on November 23, when the guest of honour will be the Minister of State, Board of Trade, the Rt. Hon. A. R. W. Low.

THE Welfare and Benevolent Association of George Blackburn & Sons, Limited, general engineers, ironfounders and hosiery machine manufacturers, held their annual dinner and dance at Co-operative House, Parliament Street, Nottingham, on November 9.

STANTON IRONWORKS COMPANY, LIMITED, have announced that 150 employees will become redundant as a result of a 15 per cent. cut in production of spun-iron pipe. It is not anticipated that any further reduction will be necessary, because the number of long-term orders is satisfactory.

SAMUEL FOX AND COMPANY, LIMITED, Stocksbridge, branch of United Steel Companies, Limited, have held the biggest exhibition of safety equipment ever staged by the company. It was opened on November 7 in connection with the National Industrial Safety Week; both equipment and protective clothing was shown.

A ONE-DAY CONFERENCE on automation, education and training is to be held at the Royal Festival Hall, London, S.E.1, on December 4. It is being organized by the British Association for Commercial & Industrial Education, and details are available from the conference secretary, 8, Hill Street, London, W.1.

CASH PRIZES totalling £686 were awarded to 86 apprentices of F. H. Lloyd & Company, Limited, James Bridge Steel Works, Wednesbury, on November 6, by the works director, Mr. M. C. Lloyd. He said that the company planned soon to enter for the "sandwich" course, apprentices who join the firm at 15 years of age.

FOR WORKING two overhead-travelling cranes beyond their safe-working load, the Lanarkshire Steel Company, Limited, Motherwell, were fined £10 on November 9, at Hamilton. H.M. Inspector of Factories said it was imperative, in the interests of safety, that overhead cranes should not be required to lift loads above their capacity.

BRITISH RAILWAYS have commenced preliminary work in connection with a large development at Townhill, Dunfermline, Fife, which is expected to cost in the region of £400,000. An area of ground extending to about 1,000,000 sq. ft. to the west of Halbeath is being cleared and levelled in preparation for the erection of a wagon repair shop.

AT THE Foundry Exhibition currently being held in Sheffield a "Shalco" MCM-5 mechanized shell coreblower will be used on the stand of Catalin Industrial Resin, Limited, to demonstrate the application of cold-process resin-coated sand. It should be noted that this will be the first exhibition appearance of the Shalco equipment in this country.

THE TRADE RETURNS of the port of Tees for the 11 months ended September 30 shows new records in ship clearances, registered tonnage, volume of imports, and port revenue. Mainly due to increased arrivals of iron ore, imports for the period totalled 4,513,582 tons. Exports, at 1,474,555 tons, were slightly below the corresponding 1955 figure.

FOUR EMPLOYEES of Enfield Cycle Company, Limited, Redditch, who had completed 50 years' service with the firm, were recently presented with gold watches by the chairman, Major F. W. Smith. Other employees with 25 years' service received awards and long-service certificates. A quarter of the employees have been with the firm for 25 years or more.

W. C. HOLMES & COMPANY, LIMITED, Turnbridge, Huddersfield, announce that they have introduced the Trion electric air filter—an electronic system applicable where a high degree of clean air is needed. The filter is being marketed by this company and Harris Engineering Company, Limited, of London. Holmes are handling industrial applications and Harris commercial applications.

THE BOARD OF TRADE announces the issue of the Export of Goods (Control) (Consolidation) Order, 1956 (SI No. 1702). The new Order incorporates the 1955 Consolidation Order and subsequent amendments for the convenience of exporters. No change is made in the law. The Order came into operation last week and can be obtained from the Stationery Office, price 1s. 6d. (by post 1s. 8d.).

TARGET CAPACITY for German steel, announced by the German Iron and Steel Federation last month, is 29,000,000 tons per annum. If output continues on the same scale as for the first 10 months of the year, the target will almost be achieved. It reached a new peak last month when 2,100,000 tons were produced, compared with 1,900,000 tons for October, 1955. The January-October output is 19,330,000 tons, against 17,690,000 tons last year.

THE DEPARTMENT OF CHEMISTRY of the Sir John Cass College, Jewry Street, Aldgate, E.C.3, announce the organization of a full-time course on "Radio-isotopes and their Uses," beginning on January 14,

News in Brief

1957. The fee for the course is £30 which includes laboratory materials, irradiations, and loan of protective clothing, but excluding accommodation. When required, assistance will be given in booking hotel accommodation in London.

UNSUITABLE SITES, lack of attraction for sufficient overseas buyers, and growing costs of representation are the reasons given by the tractor division of David Brown Industries, Limited, Meltham, Huddersfield, for not exhibiting at the 1957 Royal Show at Norwich. The decision also applies to the implement division of Harrison, McGregor & Guest, Limited, Leigh (Lancs), agricultural and general engineers, which has previously shared a stand. David Brown products will continue to be shown at the Smithfield show.

BIRMINGHAM UNIVERSITY has announced the establishment of a Chair of Statistics, thus recognizing the increased need for research in Midland industry. The Chair is to be within the Department of Pure Mathematics. Prof. K. Mather, Professor of Genetics, said on November 7 that since the war statistics as a science has been very much developed in relation to industry and particularly engineering production. In its drive for greater efficiency, industry was asking for more men who could identify production hold-ups.

OWING TO THE MERGER between S. A. John Cockerill and Société d'Ougrée-Marihaye, the selling organizations in Brussels of Ucometal and Siderur are in course of liquidation. A new selling organization, " Ucosider," has been formed to sell the steel products of the group with Ougrée Steel Trading Company, Limited, the sole selling agents in London. In view of the multiplicity of interests this latter company will trade under the name of United Continental Steels. The following are additional directors:—Mr. J. Coudel; Mr. W. V. Dauppe, and Mr. J. Mahaim.

ALAN MUNTZ & COMPANY, LIMITED, Hounslow (Middx), announces that the Billingham division of Imperial Chemical Industries, Limited, is to use the Pescara free-piston-engine system to drive, through gas turbines, several large rotary gas-compressors. These compressors will form the main machinery of a new chemical plant project now being developed. The installation involves the use of 15, 1,000-h.p. GS-34 gasifiers, the majority of which are being supplied by SIGMA, which alone can meet the initial delivery requirements, and the remainder by the Free Piston Engine Company, Limited.

POLFORD ENGINEERING COMPANY, LIMITED, now operate from Bishop Auckland, County Durham, having been transferred from Newcastle, and all correspondence, enquiries, etc., should now be so addressed (telephone Bishop Auckland 41). Sales and service in England and Wales are controlled from Bishop Auckland and the representative covering Lancashire, Yorkshire, Cheshire, Lincolnshire, North Derby and North Nottinghamshire is Mr. J. A. Hebden. 41, Nab Wood Crescent, Shipley ('phone Shipley 51929).

ADDRESSING the Non-Ferrous Club at the Queen's Hotel, Birmingham, on November 7, Sir Herbert J. Manzoni, Birmingham's City engineer and surveyor, surprised his audience by telling them that on one occasion his department bought 120 tons of pig lead at £27 per ton in order to test an experimental bridge structure, and on completion of the experiment the lead was sold at £80 per ton. At this meeting a collection which yielded £21 10s. was taken on behalf of the Earl Haig Fund. It was also announced that all the tickets for the annual dinner dance at Chadwick Manor Hotel had been sold. For the luncheon on December 6, the speaker will be Mr. A. B. Waring, chairman and managing director of Joseph Lucas, Limited.

MANUFACTURE of distribution transformers will commence shortly in Inverness, according to an announcement made by Ferranti, Limited, electrical engineers, Edinburgh. This decision to set up a plant in Inverness was taken by the company after discussions on the establishment of a new industry in the Highlands, between Mr. Tom Johnston, chairman of the North of Scotland Hydro-Electric Board, and Mr. S. Z. de Ferranti, of Ferranti, Limited. It is understood that the production of these transformers, which will be undertaken with the co-operation of Resistance Welders, Limited, Inverness, suppliers of electric resistance machinery, will commence next spring. The first transformers to be manufactured at Inverness will be for the North of Scotland Hydro-Electric Board for their electricity distribution schemes.

AT the Public Works Exhibition currently being held at Olympia, London (closing Saturday, November 17), the stand of George Cohen Sons & Company, Limited, emphasizes the range of the company's activities rather than highlights a single exhibit. Included is a diesel-driven mobile crane, a dualoader, a diesel-driven portable compressor and a concrete mixer, all of which can be offered for hire. In addition tools and other equipment are on show ranging from full sets of protective clothing to dumper barrows, pressure lamps and tarmac rakes (stand 148). Amongst the many examples of truck-mounted cranes is the Caribou model, shown by Priestman Bros., Limited—four- or six-wheel drive with petrol- or diesel-driven versions are available and the crane equipment can handle loads up to 6 tons from a 25-ft. two-piece jib (stand 24). Newton Chambers & Company, Limited, exhibit a truck-mounted development of the NCK 304 excavator and crane. The machine is shown equipped as a dragshovel but a full range of attachments can be fitted (stand 75). The Brush Electrical Engineering Company, Limited, are exhibiting electrical equipment on the Brush group stand in the Grand Hall.

WORK HAS BEGUN at the Renfrew factories of Babcock & Wilcox, Limited, on a pressure-water reactor vessel for Canada's first nuclear power plant, and the first in the Commonwealth outside Great Britain. The vessel will be 12-ft. dia., 35-ft. high and weigh 210 tons. It has been designed for a pressure of 1,200 lb. per sq. in. This announcement was made in Glasgow after a tour of the Renfrew factories, where heat exchangers for the Chapelcross (Annan) atomic power station were seen at various stages of manufacture. Babcock & Wilcox have manufactured heat exchangers for Calder Hall in the midst of their ordinary work and, in fact, exported some 128,000 tons of steam generating equipment during 1954 and 1955 when they were busy on the atomic contract. The company is associated with English Electric Limited, and Taylor Woodrow, Limited, in the construction of atomic reactors using natural uranium, graphite moderator, and carbon dioxide cooling. Among the modern equipment recently installed is a 2,000,000-v. X-ray testing machine, said to be the biggest in Europe, which will X-ray steel up to nine in. thick. To ensure an adequately trained staff of workmen for the new techniques which are constantly emerging, the construction within the works of a new school for apprentices is proceeding rapidly.

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FS/29

Raw Material Markets

Iron and Steel

Outputs of pig-iron from the 100 furnaces now in blast keep up to recent levels, and efforts continue to be made to produce as large a tonnage as possible, particularly in the basic grade. In some areas there is a pronounced shortage of basic steelmaking pig-iron, which will only be relieved when fresh units are brought into commission. The furnaces are well provided with ore for burdening the furnaces, and although there has been a reduction in imports recently due to shortage of shipping space, there are good stocks and deliveries from home sources are maintained at the improved levels. The supply of blast-furnace coke is fairly satisfactory.

Production of the foundry grades of pig-iron appears more than adequate to meet the present reduced demand from all sections of the foundry trade. Some of the engineering and speciality foundries are busy supplying castings to heavy electrical and power-plant manufacturers, machine-tool makers, and the busier home trades, which include steelworks and collieries. Improvement in the motor vehicle trade may enable many of the factories to revert to a five-day working week, with increased demands for castings.

An appreciable tonnage of low-phosphorus iron is being taken up by the foundries which use this grade, but the total tonnage is much below that previously supplied. Hematite is available in adequate quantities to meet requirements, as well as the refined grades, the call for both irons being on a reduced scale.

Although several furnaces previously producing high-phosphorus pig-iron continue to produce basic steelmaking pig-iron, the supply of the former is meeting current demands. Orders from the users, including the light, jobbing, textile, and some of the engineering foundries, are not heavy. Although output is below normal, home requirements do not fully absorb available tonnages and consignments continue to be shipped overseas.

The re-rollers maintain good order-books, and although demands may have fallen for some of their products, orders on hand absorb production. Very few fresh commitments can be accepted for export, but orders are available if home business should decline. Prices in overseas markets are remunerative to the re-rollers. Home demands are, however, generally maintained for small bars, light sections, etc., although pressure for supplies may not be so heavy. The supply of steel semis from home steelworks continue to show improvement.

Non-ferrous Metals

While it looks very much as though the Middle East situation will be settled in the near future, there are still some highly explosive issues remaining unsettled. So long as this is the position, market prices will vary according to each fresh interpretation of passing events. What is certain is that the Canal is blocked for ships of any size and their clearance may take several months. Thus the heavy fall in the price of tin last week seems to have been overdone, particularly as shipping schedules are bound to be upset for several months. This must be a bullish point impacting as it does on a strong demand for the metal, spot supplies of which are short. Scarcity of nearby supplies in America has led to the suggestion that the output from the Texas smelter be placed on the market, or, alternatively, for the US Government to loan the International Tin Council metal by which it could stabilize the price. Meanwhile, members of the international tin agreement are exercising their option to pay cash instead of tin, and Malaya is expected to contribute some $M32,000,000 into the pool over the next few months. Any purchase now, however, would only aggravate the situation and it is clear that the cash contributions will have to pile up until the price slumps to a level at which it calls for support.

Copper, although not directly affected by the Canal blockage, will feel its effects through shortage of shipping space. How strong an influence this will be remains to be seen. In the meantime, the improved outlook in Egypt has stilled demand from the Continent and lowered prices on the London Metal Exchange. Nevertheless, the undertone and near outlook may be better than it appears if one can judge by the Rhodesian Selection Trust decision to raise its fixed price by £15 to £285 a ton at the beginning of this week.

In America, Mr. Robert P. Koenig, president of Cerro de Pasco, has heartened the producers by his forecast that consumption of copper will reach 4,800,000 tons by 1965 and that the pre-war relationship between the prices of copper and aluminium are unlikely to be re-established. On the New York market supplies are moving sluggishly and the producers' are quoting 36 cents, custom smelters 35 cents, and scrap is selling at 29 cents a pound. Anaconda has cut its production at its Chuquicamata mine in Chile by 15 per cent. by the elimination of weekend and holiday working. At the same time it is reported that the mine achieved a record production of 25,000 tons in October when new plant was brought into use.

Lead is quietly steady in London. In the States the market continues strong and consumption during the first eight months of this year is given at 782,495 tons, against 759,300 tons in the comparable period a year ago. Lead sales are expected to remain at a high level for the rest of the year. The price is holding firm at 16 cents a pound.

Zinc is a good market in London and a "back" of about £4 a ton has developed, reflecting tightness of nearby supplies. This is largely due to quantities of the metal from the Continent going to the States in fulfilment of barter transactions. However, demand from Detroit is gradually picking up as automobile production continues to expand. There is, too, the rumour that India is seeking appreciable tonnages, presumably for galvanizing.

Institute of Metals

An additional general meeting of the Institute of Metals is to be held at Church House, Great Smith Street, London, S.W.1, on December 3 and 4, and brief details of the programme are given below.

Monday, December 3, will be devoted to three technical sessions, one in the morning, afternoon and evening, the main themes of which will be "Fatigue of Aluminium and its Alloys," "Copper Alloys," and "Dislocations and the Mechanical Properties of Crystals." On the Tuesday, there are to be two simultaneous technical sessions in the morning covering "Corrosion of Aluminium Alloys," "Deformation and Fracture of Zinc," and "Constitution of Titanium Alloys." That afternoon Mr. L. Rotherham will give a lecture on "Metallurgical Problems in the United Kingdom Atomic Energy Authority." Amongst the 21 papers, many of them involving highly complex metallurgy, the only paper touching on foundry practice appears to be one by Dr. Ellwood, Mr. Prytherch and Mr. Phelps on "Experiments on the Semi-continuous Casting of Bronze."

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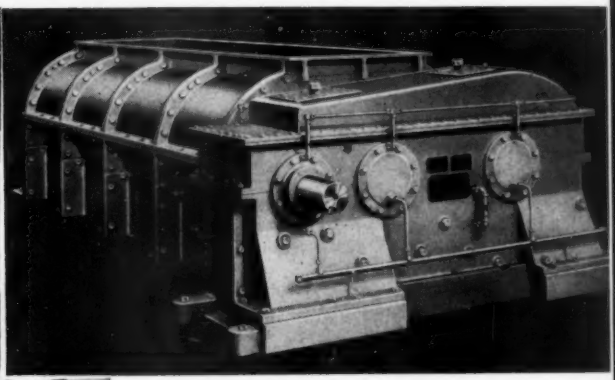

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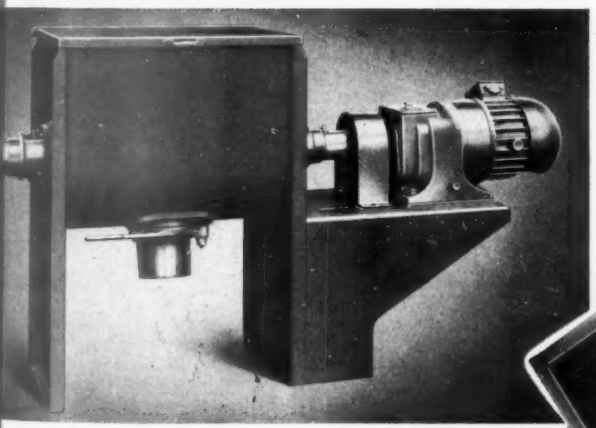

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Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

November 14, 1956

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £17 11s. 0d.; Birmingham, £17 3s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £20 8s. 0d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £20 12s. 3d.

Scotch Iron.—No. 3 foundry, £21 14s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £23 16s. 6d.; South Zone, £23 19s. 0d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £25 4s. 0d.; South Zone, £25 6s. 6d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent. :—N.-E. of England (local iron), £21 7s. 6d.; Scotland (Scotch iron), Zone S. 1, £21 14s. 0d.; Sheffield, £22 14s. 6d.; Birmingham, £23 2s. 0d.; Wales (Welsh iron), £21 7s. 6d.

Basic Pig-iron.—£18 3s. 0d. all districts.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £48 0s. 0d. to £50 5s. 0d., scale 16s. 0d. to 17s. 6d. per unit; 75 per cent. Si, £70 0s. 0d. to £73 2s. 6d., scale 16s. 0d. to 17s. 6d. per unit.

Ferro-vanadium.—50/60 per cent., 27s. 6d. per lb. of V.

Ferro-molybdenum.—65/75 per cent., carbon-free, 12s. 3d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £250 0s. 0d.; 38/40 per cent., £299 0s. 0d.

Ferro-tungsten.—80/85 per cent., 15s. 10d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 18s. 10d. per lb. of W.

Ferro-chrome (6-10 ton lots).—4/6 per cent. C, £93 10s. 0d. to £95 0s. 0d., basis 60 per cent. Cr, scale 29s. 9d. to 32s. 0d. per unit; over 6 per cent. C, £92 10s. 0d. to £93 0s. 0d., basis 60 per cent. Cr. scale 29s. 9d. to 32s. 0d. per unit; 2 per cent. C,* 2s. 1d. per lb. Cr; 1 per cent. C,* 2s. 1¼d. per lb. Cr; 0.15 per cent. C,* 2s. 2½d. per lb. Cr; 0.10 per cent. C,* 2s. 2¾d. per lb. Cr; 0.06 per cent. C,* 2s. 3d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 7s. 0d. to 7s. 6d. per lb.

Metallic Manganese.—93/95 per cent., carbon-free, £249 0s. 0d.; 96/98 per cent., £259 0s. 0d. to £265 0s. 0d.

Ferro-columbium.—65/75 per cent., Nb + Ta, 22s. 6d. to 23s. 6d. per lb., Nb + Ta.

Ferro-manganese (home).—78 per cent., £68 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., £28 19s. 0d.; tested, 0.08 to 0.25 per cent. C, £29 19s. 0d.; hard (0.41 to 0.60 per cent. C), £31 0s. 6d.; silico-manganese, £39 10s. 0d.; free-cutting, £33 3s. 0d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £36 14s. 6d., silico-manganese, £39 17s. 6d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £34 13s. 6d.; basic, hard, over 0.41 up to 0.60 per cent., C, £35 16s. 0d.; acid, up to 0.25 per cent. C, £38 17s. 6d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £35 7s. 0d.; boiler plates (N.-E. Coast), £37 17s. 0d.; floor plates (N.-E. Coast), £36 16s. 0d.; sectional material, N.-E. Coast, £33 16s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested (4-ton lots), £36 3s. 0d.; flats, 5 in. wide and under (4-ton lots), £36 3s. 0d.; hoop and strip, £36 12s. 6d.; uncoated strip mill coils, not rolled, under 3mm. to 12g., £38 16s. 0d.; black sheets (hand mill), 17/20 g., £50 4s. 6d.; galvanized corrugated sheets, 24 g., £62 2s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £61 13s. 9d.; nickel-chrome, £85 10s. 6d.; nickel-chrome-molybdenum, £96 16s. 6d.

NON-FERROUS METALS

Copper.—Cash, £285 0s. 0d. to £285 10s. 0d.; three months, £286 0s. 0d. to £286 10s. 0d.; settlement, £285 10s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 9½d. per lb.; rods, 320s. 0d. per cwt. basis; 20 s.w.g., 355s. 3d. per cwt.

Tin.—Cash, £845 0s. 0d. to £850 0s. 0d.; three months, £812 10s. 0d. to £815 0s. 0d.; settlement, £850 0s. 0d.

Lead (Refined Pig).—First half November, £120 10s. 0d. to £120 15s. 0d.; first half February, £118 5s. 0d. to £118 10s. 0d.

Zinc.—First half November, £101 10s. 0d. to £101 15s. 0d.; first half February, £97 10s. 0d. to £97 15s. 0d.

Zinc Sheets, etc.—Sheets, 15 g. and thicker, all English destinations, £132 15s. 0d.; rolled zinc (boiler plates), all English destinations, £130 10s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £110.

Brass Tubes, etc.—Solid-drawn tubes 2s. 3½d. per lb.; rods drawn, 3s. 1½d.; sheets to 10 w.g., 238s. 0d. per cwt.; wire, 2s. 11½d.; rolled metal, 238s. 0d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £205; B6 (85/15), —; BS249, —.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £260; HTB2 (38 tons), —; HTB3 (48 tons), —.

Gunmetal.—BS1400, LG2 (85/5/5/5), £283; LG3 (86/7/5/2), £291; G1 (88/10/2/½), £345; (88/10/2/1), £340.

Phosphor Bronze.—BS1400, PB1 (AID released), £360 per ton.

Phosphor Bronze Strip, etc.—Strip, 341s. 3d. per cwt.; sheets to 10 w.g., 341s. 3d. per cwt.; wire, 4s. 5½d. per lb.; rods, 3s. 9½d.; tubes, 3s. 7½d.; chill cast bars: solids 3s. 9½d., cored 3s. 10½d. (CHARLES CLIFFORD, LIMITED).

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide x 0.056, 4s. 0½d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 5½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 4½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 4d. per lb. Antimony, English, 99 per cent., £210 0s. 0d. Quicksilver, ex-warehouse, £83 10s. 0d. Nickel, £519 0s. 0d. Aluminium ingots, £198 10s. 0d.; aluminium bronze (BS1400), AB1, £295; AB2, £320. Solder, brazing, BS1945, type 1 (50/50), 3s. 1d. per lb., type 9 (54/46), 3s. 4½d. per lb.

* Average 68–70 per cent.

Forthcoming Events

NOVEMBER 19

Institution of Production Engineers

Sheffield graduate section:—"Corrosion Prevention," by M. Lewis, M.A., B.Sc., 6.30 p.m., at Gummers, Limited, Rotherham.

NOVEMBER 20

Institute of British Foundrymen

East Anglian section:—"Modern Methods of Patternmaking, with Particular Reference to Pressure-cast Patternplates," by B. N. S. Perry, 7.30 p.m., at the Lecture Hall, Public Library (Old Foundry Road entrance), Ipswich.

Institution of Works Managers

Birmingham branch:—"Apprenticeship Training in Great Britain and in Germany," 7 p.m., at the Midland Institute, Paradise Street.

Institution of Production Engineers

Halifax section:—"Recent Developments in High Production Foundries," by J. D. Berry, 7.15 p.m., at the George Hotel, Huddersfield.

NOVEMBER 21

Institute of British Foundrymen

Southampton section:—"Shell Moulding," followed by film, 7.30 p.m., at the Technical College, St. Mary Street.

London branch:—Symposium on "Dust, Fume, and Heat Suppression": (*a*) "Cupola Furnaces," by M. M. Hallett, M.Sc., and Mr. T. Shaw; (*b*) "Electric-arc Steel Furnaces," by J. Bain, and (*c*) "Crucible Furnaces," by D. W. Brown, 7.30 p.m., at the Constitutional Club, Northumberland Avenue, London, W.C.2.

Scottish North-East section:—"Jobbing Production of Light-alloy Castings," by A. S. H. Sawers (details from the secretary).

Incorporated Plant Engineers

Kent branch:—"Operation and Maintenance of Fuel Economizers," by H. J. Gardner and M. R. Wagner," 7 p.m., at the Kings Head Hotel, High Street, Rochester.

Birmingham and District Industrial Safety Training Centre

Crane Drivers' and Slingers' Course:—Details from the secretary, W. G. Appleyard, 21, Steelhouse Lane, Birmingham, 4.

Institution of Production Engineers

Birmingham section:—"Use of Isotopes in Industry," by Dr. H. Seligman, Ph.D., 7 p.m., at the James Watt Memorial Institute, Great Charles Street.

Wolverhampton graduate section:—"Designing for Production," by G. S. Rowland, 7.30 p.m., at the Wolverhampton and Staffs Technical College, Wulfruna Street.

NOVEMBER 22

Institute of British Foundrymen

Northampton section:—"Carbon-dioxide Process," by Dr. D. V. Atterton, 7.30 p.m., at the Hind Hotel, Wellingborough.

Institute of Metals

Birmingham local section:—"Fatigue," by N. Thompson, B.Sc., Ph.D., 6.30 p.m., at the Birmingham Exchange and Engineering Centre, Stephenson Place.

Institution of Production Engineers

Northern Ireland section:—"Incentive Schemes for Maintenance," by C. W. Williamson, O.B.E., 7.30 p.m., at the Kensington Hotel, College Square East, Belfast.

Southampton Metallurgical Society

"Effects of Irradiation on Fissile Materials," by J. A. L. Robertson, at Southampton University Lecture Hall.

THE BIRMINGHAM AND WEST MIDLANDS BRANCH of the Institute of British Foundrymen announces a change in its programme for the meeting on November 28, because Mr. D. Fleming, who was to be the lecturer, is shortly going abroad. Instead, Mr. E. Loebbecke has agreed to give a paper entitled "Hot-blast Cupola Practice." (Readers will be interested to learn that it is proposed shortly to print in this JOURNAL a substantial abstract from Mr. Loebbecke's paper "Development of Hot-blast Cupola Melting Technique in Europe," which was recently presented to the American Foundrymen's Society.)

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Personal

Mr. B. A. P. DOBSON has been appointed a director of the British Northrop Loom Company, Limited.

Mr. EDGAR GOODHALL, a chief planning engineer, with Rolls-Royce, Limited, retired recently after 41 years' service.

Mr. S. R. EADE has been appointed managing director and Mr. J. CLEMENT, B.Sc., sales director of the A.E.I. Lamp & Lighting Company, Limited.

Mr. WILLIAM F. JONES, secretary of H. W. Lindop & Sons, Limited, ironfounders, of Walsall, retires at the end of this month after 50 years' service with the firm.

Mr. S. G. GATES, chairman, and Mr. P. R. SCUTT, managing director, of Tecalemit, Limited, Plymouth, have left on an extensive business trip to Australia. Whilst there they will visit the Tecalemit factory at Adelaide.

Sir IFOR EVANS has been appointed chairman of the National Insurance Advisory Committee as from January 1, 1957, in place of Sir WILL SPENS whose term of office recently expired but who agreed to continue as chairman until the end of the year.

Alderman B. O. DAVIES, chairman of the Tees Conservancy Board, has completed 40 years' service as a member of the board. He succeeded the late Mr. George West Byng as chairman in 1951. Ald. Davies is chairman of the Cleveland Shipping & Lighterage Company, Limited.

Mr. LUTHER GAUNT, who has been chief clerk of the Leeds & Bradford Boiler Company, Limited, Stanningley, near Leeds, for the past 55 years, retired on November 2. At a ceremony at which the 90-year-old company chairman, Mr. H. Hattersley, was present, Mr. Gaunt received presentations.

Chairman of the Wolverhampton and district branch of the Society of Industrial Civil Defence Officers, which was formed recently, is Mr. R. W. LATHAM, of the Rubery Owen Organization. Mr. F. H. REYNOLDS (West Midlands Gas Board) is vice-chairman and the secretary is Mr. G. E. HALL (Wolverhampton Metal Company, Limited).

Mr. D. W. HAMMOND, works director, William Jessop & Sons Limited, Sheffield, and vice-president of the firm's Brightside Works Ambulance Corps presented the awards to members of the Corps on their year's work. No fewer than 74 members, including 20 women, had passed the St. John's Ambulance examination. The Corps had the largest entry for 15 years.

Mr. BRIAN DYSON, aged 25, a works area engineer in the rolling mills, and Mr. DONALD GARMONSWAY (30), a metallurgist and shift superintendent in the Siemens department, of the English Steel Corporation, Limited, Sheffield, are to spend a year in Australia. They are the first to go on an exchange scheme between the corporation and the Broken Hill Proprietary Company, Limited.

Sir GEORGE EARLE is giving up the chairmanship of Associated Portland Cement Manufacturers, Limited, and its subsidiary, British Portland Cement Manufacturers, Limited, at the end of the year. He will then become president of both companies. From January 1, 1957, Sir George will be succeeded as chairman of both companies by Mr. J. A. E. REISS, at present deputy chairman. Also from that date, Mr. V. E. ELLISON, at present a member of both boards, will take up the managing directorships. Mr. Elliott will also be chairman of the Cement Marketing Company, Limited, in place of Mr. Reiss.

Obituary

A FOREMAN at the Staveley (Devonshire Works) Blast Furnaces, for 40 years, Mr. GEORGE STEVENTON, has died at the age of 79.

Mr. JOHN ERIC STEEL, who died on November 6 at the age of 48, was chairman of the North Regional Council of the Federation of British Industries and was associated with many companies. Mr. Steel collapsed and died after returning from hunting with the Morpeth Foxhounds, of which he was Master. Chairman and managing director of Steel & Company, Limited, Sunderland, he was also managing director of Steels Engineering Installations, Limited, Steels Engineering Products, Limited, the Alston Foundry Company, Limited, and a director of several other companies, including the Burntisland Shipbuilding Company, Limited, Pelapone Engines, Limited, Steel & Gunton, Limited, Euk Catering Machinery, Limited, Archibald Low & Sons, Limited, and Rea Bros., Limited.

German Steel Prices Raised

After some months of negotiation and discussion with the Finance Ministry, the average price of rolled steel in western Germany has been increased by an average figure of DM. 32 per metric ton, *i.e.*, roughly £3 per long ton.

The price of basic Bessemer (Thomas) steel has been raised by some DM. 26.5 and that of open-hearth steel by DM. 38.5, the mean increase corresponding to a rise of 6.34 per cent. above the previous figure.

Discussing this increase in prices with a representative of "Handelsblatt," the chairman of the German Iron and Steel Trades Association, Dr. H. G. Sohl, pointed out that German steel prices had remained steady since the opening of the common market of ECSC in May, 1953, whereas the other members of the community and Britain and the USA had all raised their prices in the same period. Since 1953 the German industry has had to face the following increase in costs:—30 per cent. in the price of scrap; 20 per cent. in wages, and 15 per cent. in the price of coal, including imports of coal from America. Since October 20, in addition, the industry was faced with an increase of about 13s. per ton in the price of blast-furnace coke (an increase of 10 per cent.), and an increase in the price of Swedish ore which will take effect in the coming year. Taking into account the higher freights, the mean cost of ore from Sweden will be some 10 per cent. higher in 1957.

The price of foundry and hematite pig-iron has also been increased by DM. 34-37 per metric ton.

In spite of this price increase the mean price of German rolled steel is still among the lowest of the prices ruling in the ECSC countries.

UNSUITABLE SITES, lack of attraction for sufficient oversea buyers, and growing costs of representation are the reasons given by the tractor division of David Brown Industries, Limited, Meltham, Huddersfield, for not exhibiting at the 1957 Royal Show at Norwich. The decision also applies to the implement division of Harrison, McGregor & Guest, Limited, Leigh (Lancs), agricultural and general engineers, which has previously shared a stand. David Brown products will continue to be shown at the Smithfield Show.